The Electrical Industry's Weekly Magazine January 4, 1960

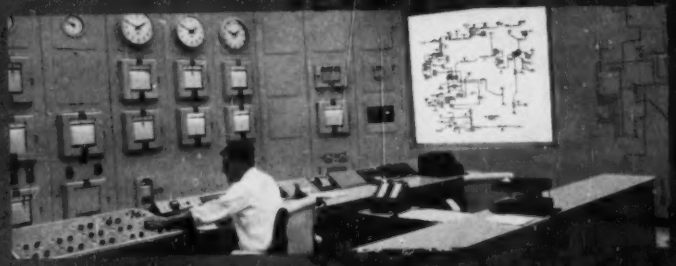
Electrical World

Price 50 cents Annual Statistical Publication

New Utility Buildings

Public Service E&G distribution center has air-to-air heat pump ... p 31

Consumers Power constructs bomb-resistant power control center ...p 28



UNIV MICROFILMS INC GS
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21 Years Underground

—and still as good as new!

21 years ago, the **Niagara Mohawk Power Company** specified Burndy MOLEs for their underground modernization program. Specifications called for a connector that would perform without fault, under prolonged exposure to dampness, oils, extreme temperatures, and last the life of the cables connected. The MOLEs met all specifications, and are as good as new today ... proof beyond doubt that Burndy MOLEs have the high quality necessary for underground systems.

Utilities thruout the country have had similar long years of trouble-free experience with the MOLE ... experience that proves that the MOLE meets underground specifications for maximum dependability.

If you are considering "going underground", or expanding your present system don't take a chance on costly burnouts and disrupted service, call your local Burndy representative ... he has had years of underground experience and can help you get maximum dependability and flexibility in your underground system.

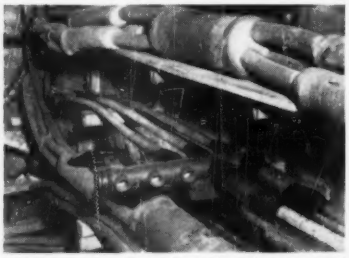


Photo from Niagara Mohawk Power's file, dated 1938, showing actual installation of MOLE in its underground system. These same MOLEs are in operation today, after 21 years of trouble-free performance.

BURNDY

59-19

ELECTRICAL CONNECTORS

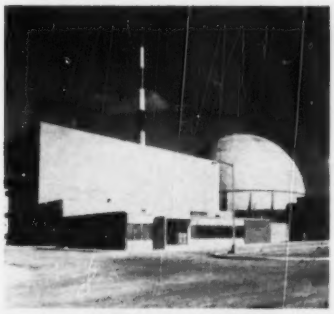
Norwalk, Connect. In Europe: Antwerp, Belgium Toronto, Canada

Electrical World

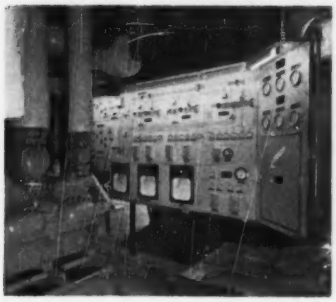
Vol. 153, No. 1 JANUARY 4, 1960

Published for 86 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

In This Week's Issue



P 24



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Louis Teitelbaum, Public Service E&G Co

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Computer Selects Most Economical Secondary

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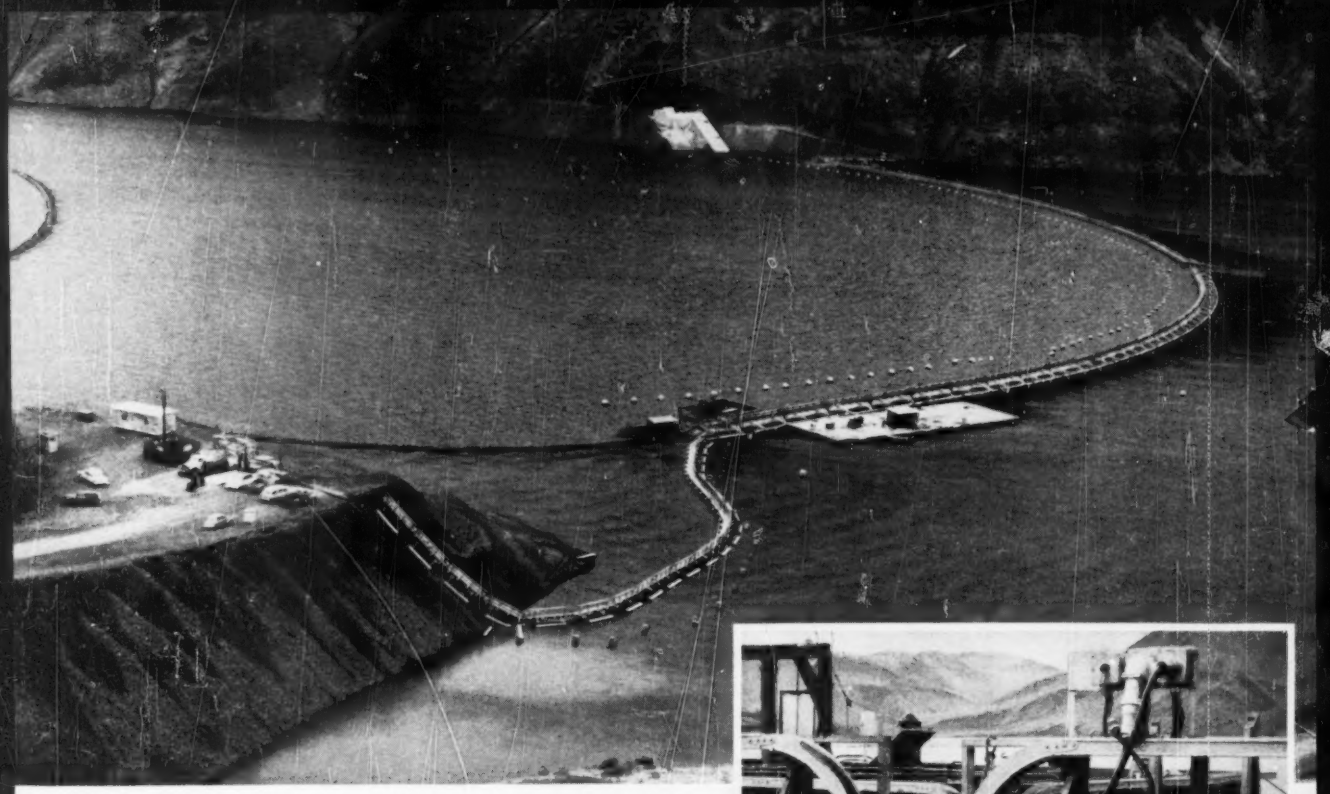
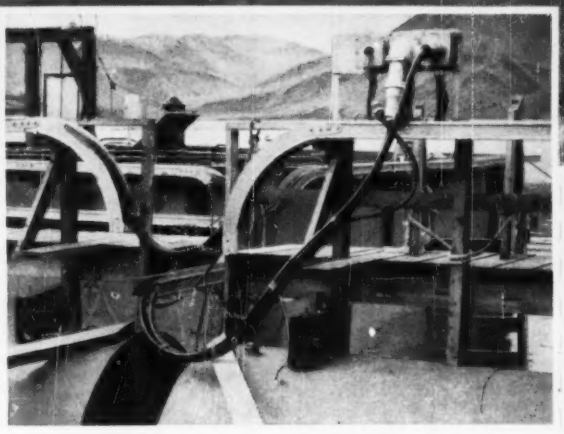


This is the "fish net"—stretching more than a half-mile across the reservoir behind Idaho Power Company's Brownlee Dam in the Hells Canyon reach of the Snake River, bordering Idaho and Oregon. The migrant fish facility, designed to save salmon and steelhead from a drop over the spillway of the 395-foot-high Brownlee Dam, depends on Okolite-Okoprene 600-volt power and control cable for continuous, all-weather operation. Fish trapped at three skimmer-barges attached to the net are taken by specially designed trucks for release down-river.



Here is Okolite-Okoprene on the job, providing power to two 21,000-gallon-per-minute pumps which create artificial currents that lure the fish into channels in the trap. Multi-conductor control cable also enables a complicated maze of control equipment—almost completely automated—to be operated both from the barges and a shore station.

Idaho Power chooses Okolite-Okoprene cables for power and control at "world's biggest fish net"

Okolite-Okoprene 600-volt power and control cable is at the heart of Idaho Power's new fish conservation facility behind Brownlee Dam in Hells Canyon, on the Idaho-Oregon border.

The "world's biggest fish net"—300,000 square feet in size behind the giant Snake River dam—depends on nine-conductor Okolite-Okoprene control cables to carry current to almost completely automated control equipment. And Okolite-Okoprene three-conductor power cables provide power to motors driving two 21,000-gallon-per-minute pumps which create artificial water currents, luring fish into channels in the trap.

Both Idaho Power and International Engineering Company, the consulting engineers, specified Okolite-Okoprene for the project, seeking maximum operating dependability. The cables are constantly exposed to weather and, in the center section, are submerged in water. Their flexible stranding helps them withstand the movement of the barges on the lake, as well as handling during removal of barge sections or traps.

At the "world's biggest fish net," as in other projects where maximum dependability and proved service life are required, Okolite-Okoprene was recognized as the best cable for the job. Its long life and dielectric strength . . . its resistance to corona cutting, moisture, heat, chemicals and mechanical damage make it the most reliable cable on the market. For the full story on Okolite-Okoprene, write for Bulletin EW-1085. The Okonite Company, Subsidiary of Kennecott Copper Corporation, Passaic, N. J.

where there's electrical power . . . there's **OKONITE CABLE**

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ELECTRICAL WORLD
Vol. 153, No. 1, January 4, 1960

Published weekly by McGraw-Hill Publishing Co., Inc., James H. McGraw (1860-1948), Founder. **Executive, Editorial, Circulation and Advertising Offices:** McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y. Printed at 99-129 North Broadway, Albany 1, N. Y. See panel below for information regarding subscriptions or change of address.

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Subscriptions are solicited from executive, supervisory, and engineering personnel in electric utilities, manufacturing companies, and related fields; and from consulting engineers and electrical engineers in industry. Position and company connection must be indicated on subscription orders. Send to address shown in box below.

United States and Canada subscription rate for individuals in the field of the publication $6.00 per year; single copies 50 cents. Other Western Hemisphere and the Philippines $20.00 payable in advance and other countries $30.00 payable in advance.

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Postmaster . . . Please send form 3579 to Electrical World, 330 W. 42nd St., New York 36, N. Y.

LETTERS

Rural Co-op Men Speak Up

▶ Here are two representative letters we've received attacking our Nov. 23 Politics and Public Power column. We stand firmly behind this particular column. We will criticize Mr. Ellis or any other person in the power business whenever we believe it is deserved. But we believe those criticized have a right to defend themselves, and thus we are pleased to print the letters in full.

We have given Mr. Ellis space (e.g., his USSR trip, EW, Dec. 14, p 40) to express his views, as we gladly do for any important person in the business. We believe these statements stand for themselves.

To the Editor:

Your editorial entitled "Politics and Public Power" in the November 23 issue of Electrical World was unfair and untrue.

The editorial made it appear that certain remarks I made at a regional meeting, and a letter written by NRECA General Manager Clyde T. Ellis six weeks earlier were conflicting views of the role of the rural electric cooperatives. We weren't even talking about the same things. Your editorial lifted our remarks from context, and then misinterpreted them so that there is little resemblance to fact.

I think it disgraceful that a publication of McGraw-Hill would stoop to "highly emotional," "political recklessness," in your own words, to charge that our General Manager compared any of his "fellow Americans to . . . Nazi murderers." He was carrying out his duty in transmitting to Members of Congress the opinion frequently expressed, and adopted in resolutions by our rural electric cooperatives, that power companies should not continue to be allowed to deduct propaganda advertising as a necessary business expense from their income taxes. You brush this viewpoint off with a pontifical observation that the subject was too involved to discuss in our letter.

You then proceed to imply that I disagree with Mr. Ellis. I would like to go on record that I agree with him completely in the matter of income tax deductions for propaganda advertising, and echo his statement that power company propaganda such as he cited is similar to Hitler's "big lie techniques."

Walter Harrison, President
National Rural Electric Cooperative Assn.
2000 Florida Ave, N. W.
Washington 9, D. C.

To the Editor:

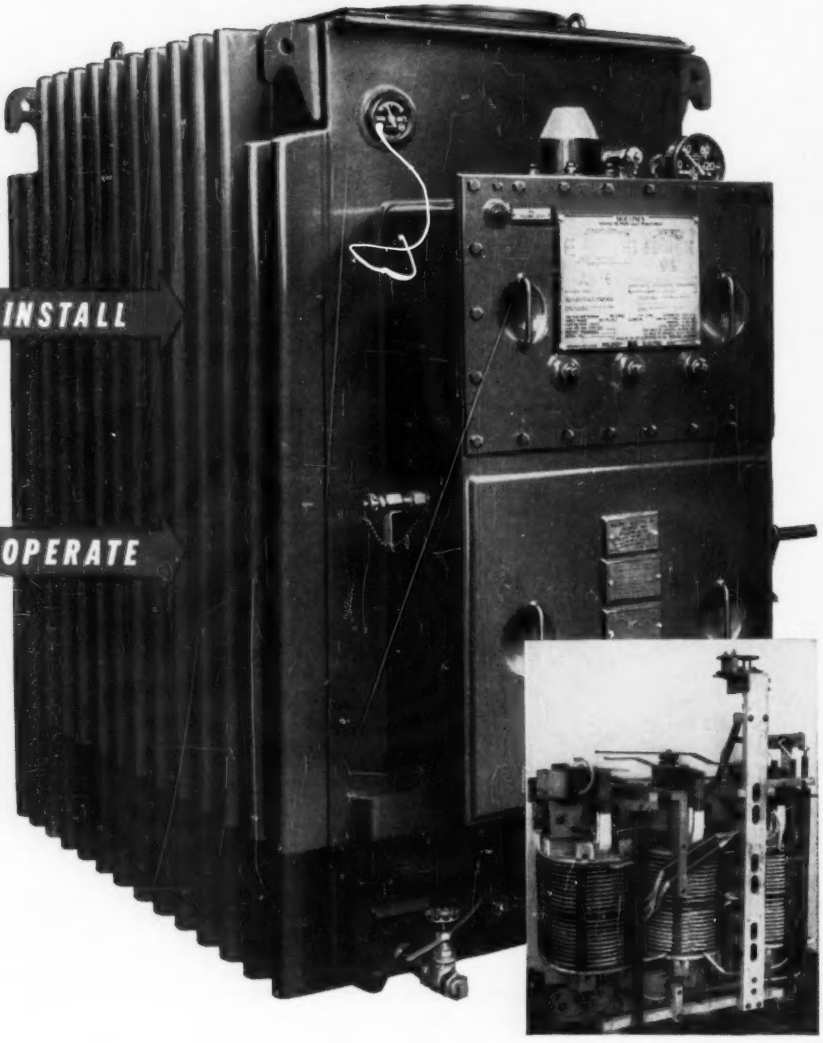
I have read with interest your editorial on Page 12, Electrical World, issue of November 23, 1959, "Politics and Public Power."

(*Continued on page* 64)

ECONOMICAL

TO INSTALL

TO OPERATE



BECAUSE:

1. Each tank side completely corrugated out of one piece of metal, requiring welds only at the corners.
2. No thinning of the metal occurs at corrugations.
3. The corrugations do not need sidewall bracing therefore, another possible source of corrosion is eliminated.
4. Tank is easily cleaned from above and there are no inaccessible areas to hinder painting.
5. The tank and handhole covers are welded in place to eliminate the possibility of leaks, however, bolted covers are available if required.
6. Network transformers with corrugated tanks are smaller in size than old style tube type tanks.
7. Reduced size allows installation of larger units in existing vaults.
8. Protection against corrosion is provided by undercoating the base and the lower portion of the tankwall.
9. The core, coil, leads, supporting members and framework are uniquely combined to give ample electrical clearance and to obtain a rugged unit that is exceptionally compact.
10. Low sound level means better customer relations.

Moloney Network Transformers are uniquely designed both inside and out to provide a superior unit for use on secondary network distribution systems. The corrugated tank coupled with a compact, rugged core and coil assembly having high overload capability, offers the potential user many reasons for purchasing Moloney Network Transformers.

These units are available in types conforming to EEI-NEMA Standards or in types especially designed to meet the requirements of your network system.

Specify Moloney Transformers for every application . . . All Along The Line.

M-ESS-10

MOLONEY ELECTRIC COMPANY

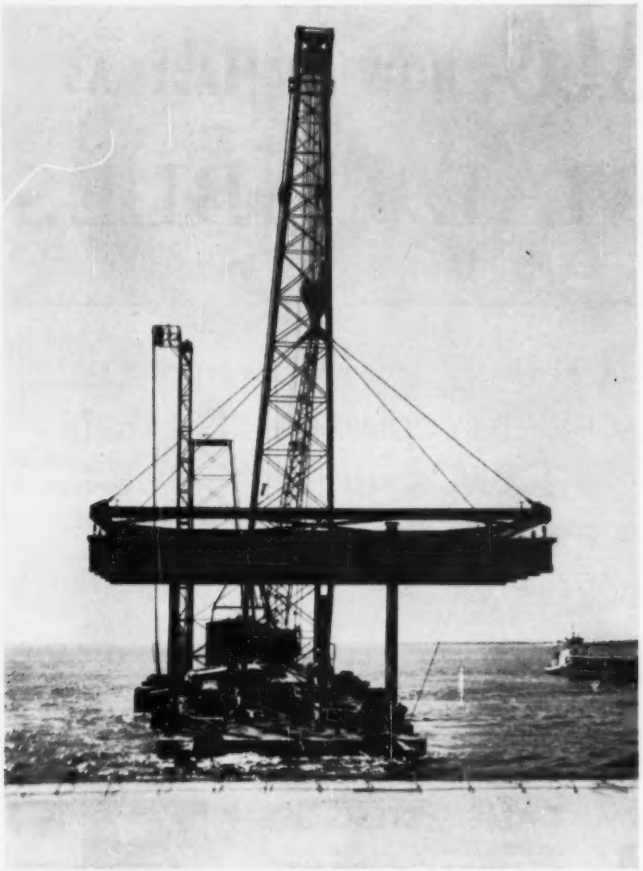
Transformers for Utilities, Industry and Electronic Applications

FACTORIES AT ST. LOUIS 20, MO., AND TORONTO, ONT., CANADA

Sales Offices in All Principal Cities

Another new development using

B.F.Goodrich Chemical *raw materials*



160-ton concrete roadway sections cast by Prestressed Concrete Products Co., Inc., Mandeville, La., are barged to Pensacola, Florida, and lifted onto piers of this new highway bridge.

2" vinyl conduit for bridge lighting and ¾" for navigation lights encased in concrete parapet, poured after bridge slabs are in place. Conduit is made by Dixie Plastics Mfg. Co., Division Marine Controls Laboratories of New Orleans. B.F.Goodrich Chemical Company supplies Geon vinyls.

40,000 feet of conduit made of Geon vinyl matches permanence of concrete structure

Electrical conduit made of Geon rigid vinyl will be encased in concrete to become a permanent part of this new 3-mile bridge. It's permanent because Geon vinyls resist the moist, salt atmosphere; corrosion won't shorten life or cause clogging of the conduit.

A unique, sealed slip joint, also made of Geon vinyl, in each conduit line is inserted between every concrete section. This allows for expansion and contraction of the bridge, while maintaining a watertight seal in the conduit.

Rigid vinyl conduit and pipe made from Geon is lightweight and easy to install. Being a non-conductor, vinyl is not affected by ground currents. It has high tensile and impact strength, and it resists fungi, bacteria, heat and cold. To learn more about these and other products made from Geon vinyls, write Dept. GX-1, B.F.Goodrich Chemical Company, 3135 Euclid Ave., Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Geon VINYLS

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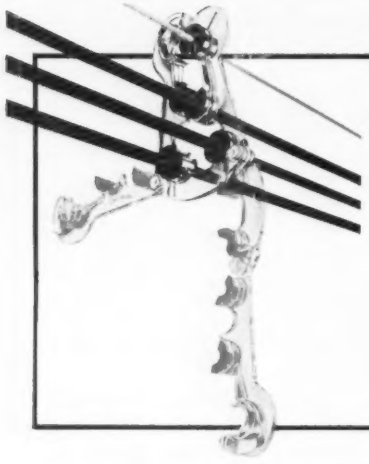
GEON vinyls • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers

Compresto® NOW AVAILABLE AS SPACED AERIAL CABLES



THE ULTIMATE IN A *COMPACT* SYSTEM CAN NOW BE ACHIEVED BY COMBINING Compresto CABLES WITH **PLM's** NEW "WRAPAROUND" **5KV** SPACERS

FOR **15KV** SPACED AERIAL CABLE SYSTEMS USE **Southern Electrical's** Compresto CABLES AND **PLM's** NEW HIGH **ALUMINA** "WRAPAROUND" "LIFETIME" SPACERS

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OLIN MATHIESON • METALS DIVISION • CHATTANOOGA, TENNESSEE

See Edward R. Murrow on "Small World" every Sunday evening, CBS-TV.

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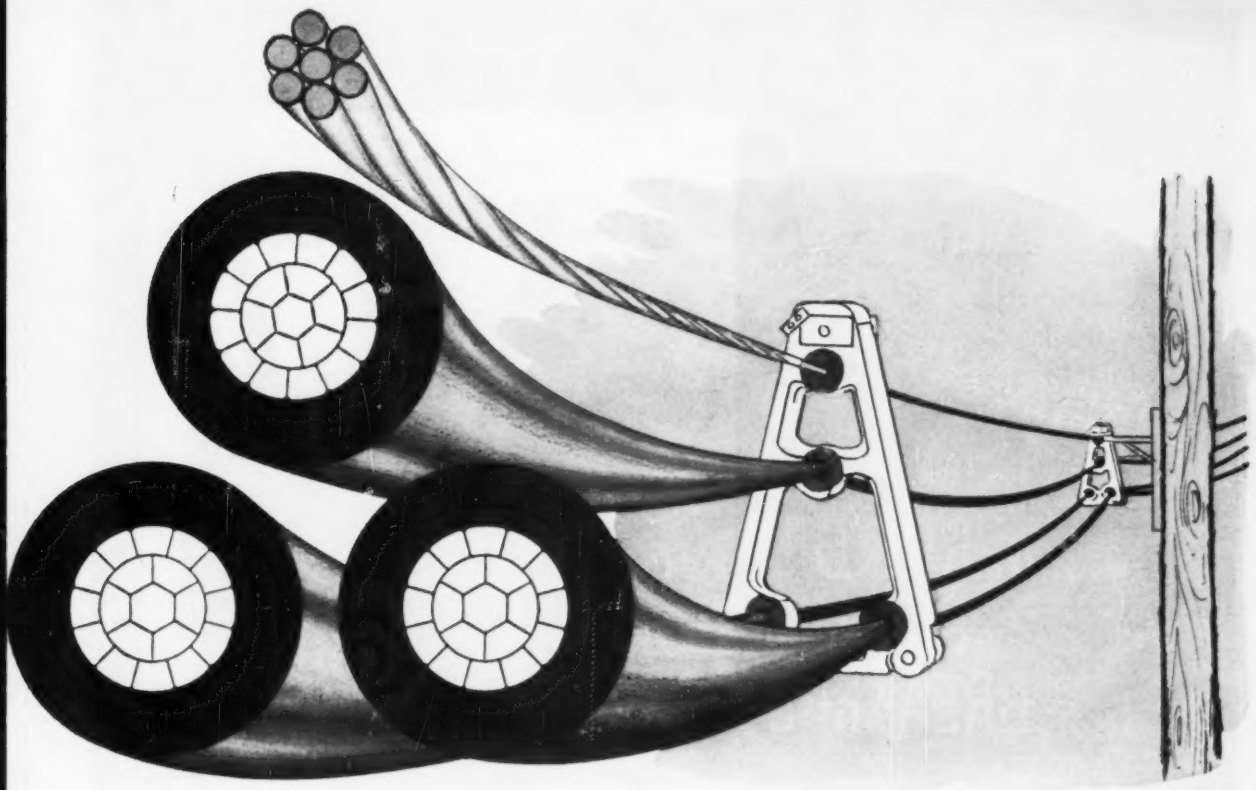


ADVANTAGES OF COMPRESTO CABLES

C OMPRESTO aerial cable is the lightest, most compact stranded conductor available today.

O PERATION through storms and ice conditions greatly improved.

M ORE economical than fully insulated aerial cables.

P HASE identification is positive and simple.

R EACTANCE is less, thus more improved voltage regulation.

E ASY to install.

S AME ampere rating as with open wire construction.

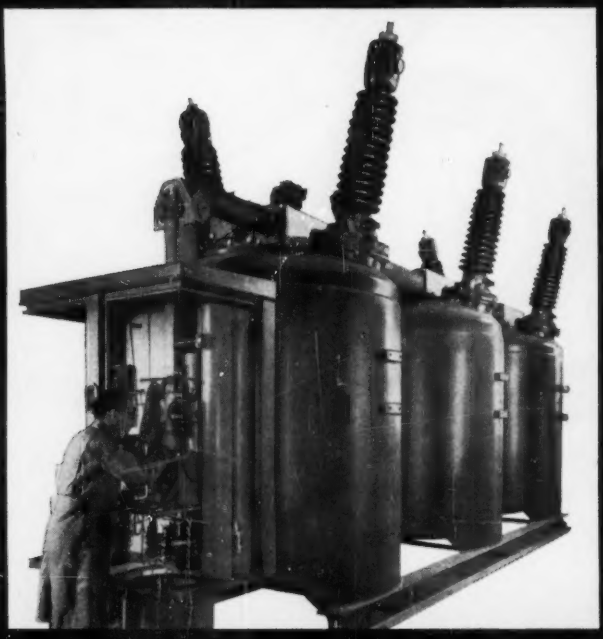
T APS and transformers may be added with little difficulty.

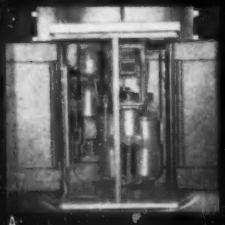
O FFERS improved resistance to compression cutting of the covering.

Write for brochure on Aerial Cables

Another Engineering Achievement

Federal Pacific design flexibility in RHE OIL CIRCUIT BREAKERS





A

B

C

meets increased rating requirements without obsolescence

Time proven, reliable Federal Pacific RHE Oil Circuit Breakers keep pace with the increased interrupting requirements of today's huge power systems. Balanced design permits engineering advancements to keep pace with rating advancements...prevents obsolescence while maintaining high standards of reliability, quiet performance, and simplified maintenance.

These basic design features make it possible:

- Overall simplicity.
- Rotary-contact structure.
- Sliding-shoe contacts.
- Self-energizing condenser-jet interrupters.
- ASA Standard bushings.

These outstanding operator developments put Federal Pacific on top in design leadership:

A—MO-5 SPRING OPERATOR—First type used to provide energy for closing the RHE breaker. Spring operator was a balanced design employing oil-hydraulic compression of closing springs. Capable of one immediate reclosure, it still does its job well.

B—OA-4 HYDRAULIC OPERATOR—Applied to the RHE oil circuit breaker to provide closing energy required by higher interrupting ratings. Provides up to five immediate reclosures from stored energy. Incorporates a piston type accumulator to store energy. A pressure regulator insures constant closing speed and energy over the operating pressure range of the accumulator. Very simple and compact operator for use on oil circuit breakers in ratings up to 230 kv 15,000 mva.

C—OA-5 HYDRAULIC OPERATOR—the OA-5 follows the hydraulic design principles developed for the OA-4 and provides the extremely high closing energy required by the new higher capacity oil circuit breakers. Newly designed piston accumulator system provides required large energy storage with uniform energy release over operating range, insuring constant closing speeds.

Flexible design...proven reliability...lower maintenance costs...your Federal Pacific Field Engineer can give you an actual demonstration of the RHE breaker features right at your own desk. Federal Pacific Electric Company, General Offices: Newark 1, New Jersey—The Best in Electrical Control, Distribution and Power Equipment.

FPE **FEDERAL PACIFIC ELECTRIC COMPANY**

Affiliated with Cornell-Dubilier Electric Corporation

The Electrical Week

LATE NEWS ▶ **Duke Power cuts rates to commercial customers** over $1,650,000, effective Jan. 1. North and S. Carolina commissions have OK'd cut.

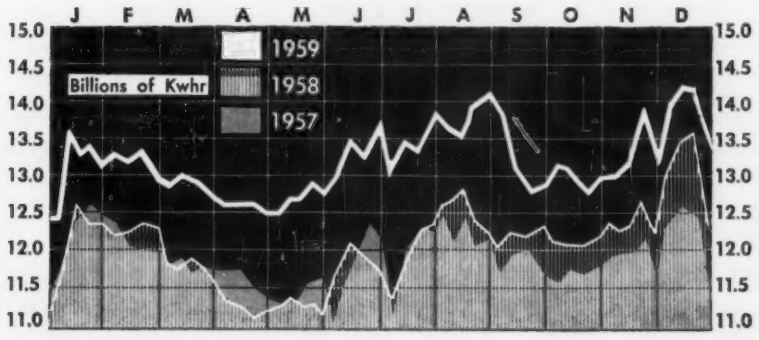
GE slices 5% off price of 50-kvar power capacitors to reflect design changes resulting in size and weight reductions. Company also drops hydro generator prices by 10%.

Around the States . . . New Mexico Supreme Court rules rural co-ops are not public utilities; therefore, PSC has no jurisdiction over them . . . Georgia Electric Membership rules out any possible settlement of its dispute with Georgia Municipal Assn over bill permitting co-ops to operate within city limits . . . Pennsylvania Gov Lawrence says law banning public utility strikes is unconstitutional . . . Vermont PSC directs Vermont Electric, Central Vermont PS and Green Mountain Power to show cause why a series of pacts between VELCO and Niagara Mohawk should not first have been submitted for PSC approval.

Atomic News . . . AEC receives five proposals from municipalities and co-ops in response to its invitation for construction of a 16,500-kw pressurized water reactor. Proposals came from City of Miamisburg, Ohio; City of Detroit, Mich.; City of Fort Pierce, Fla.; City of Jamestown, N. Y.; and Dairyland Power Cooperative, La Crosse, Wis. . . . AEC examiner recommends permit to Allis-Chalmers to build reactor for Rural Cooperative Power Assn, Elk River, Minn., for '62 completion. Plant to cost $15 million, of which AEC will put up $11,445,000.

Management changes . . . Narragansett Electric elects E. G. Twohey president, succeeding William Webster, now NEES president . . . Charles Bolton becomes financial vp of Hartford Electric Light . . . United Illuminating names M. F. Beebe and E. H. Walton vps . . . R. S. Nelson, president of Gulf States Utilities, also becomes board chairman.

WEEKLY POWER OUTPUT—Up 8.2% (Week ending Dec. 26), Kwhr 13,400,000,000



Above figures are preliminary. Regional totals are not available because of holiday.

Per Cent Change From Previous Year

	Dec. 5	Dec. 12	Dec. 19
Total U. S.	+ 6.8	+ 5.3	+ 4.6
New Eng.	+ 3.0	+ 2.9	+ 2.1
Mid. Atlan.	+ 4.9	+ 4.7	+ 4.6
Cent. Ind.	+ 6.7	+ 5.6	+ 5.3
West Cent.	+ 4.6	+ 1.7	+ 0.7
Southeast	+ 9.4	+ 4.1	+ 2.2
South Cent.	+ 8.7	+ 7.3	+ 7.7
Rocky Mount.	+ 2.0	+ 0.7	+ 0.9
Pacific			
NW	+ 4.6	+ 8.4	+ 5.1
SW	+10.6	+11.7	+11.3

Source: Edison Electric Institute

Preview of This Issue

EVENTS ▶ **A new tack on processing spent nuclear fuels** was taken last month by five utilities and a chemical company. A study costing about $250,000 could bring about the first private reprocessing plant **(p 24)** . . . Sen Moss reveals highlights of report on Soviet power. Emphasis is on hydro and EHV **(p 26)** . . . Agreement on U. S. and Canadian development of the Columbia River came a step closer with recommendations by the International Joint Commission **(p 27)** . . . Consumers Power Co's new bomb-resistant underground control center includes some novel features **(p 28)**.

ENGINEERING ▶ **Combination company turns to all-electric heat pump** installation for one of its buildings. Public Service E&G has an installation with capacity to heat and cool a 29-acre area in its new Moorestown Distribution Headquarters **(p 31)** . . . Gulf States Utilities places steel towers on the river side of the levee for transmission line crossing of the Mississippi **(p 34)** . . . Computer study reveals No. 2/0 aluminum cabled secondaries are most economical of three secondary conductor configurations for Public Service of Colorado **(p 36)**.

PROCUREMENT & PRODUCTS ▶ **Manufacturers look for a good year** . . . NEMA sees 7% increase in over-all business . . . Line Material shaves 4½ to 9% off published

Politics and Public Power

PASSAMAQUODDY: THE ONE TO WATCH

The recent report by the International Passamaquoddy Engineering Board on its investigation of the Passamaquoddy Tidal Power Project—and particularly, two of its conclusions—may have the effect of tossing the proposed joint project right smack in the middle of the U. S. private-vs-public power controversy. This will come into focus partly when the International Joint Commission (IJC) holds a series of hearings on the subject early this year.

Two conclusions in the report are bound to have political ramifications:

• Its enormous cost. The Engineering Board's report puts the cost of the tidal project with auxiliary capacity built at Rankin Rapids at a cost of some $630 million. This would make it our most expensive single federal power project.

• To be economically feasible, according to the report, it must be built entirely by the U. S. with funds provided at a 2½% interest rate—less than the long-term cost of money to the Treasury.

The board backs up this conclusion by first pointing out that it is current federal practice to use a 2½% interest rate for the economic analysis of water-resource projects, whereas the Canadian practice is to use 4⅛%; and second, in doing so, it becomes necessary to work out separate benefit-to-cost ratios for the U. S. and Canada. These ratios, assuming equal division of power output and project first cost, are 1.31 and 0.58, respectively, for a 50-year amortization period. For 75 years, the ratios become 1.53 and 0.63. Therefore, if it is to be done, the U. S. must do it alone.

The report also points out that Canada does not include taxes in its public projects

prices of lightning arresters, 15 kv and below . . . Electric utilities will use 12% more coal in '60 than they did in '59, National Coal Assn predicts (p 54) . . . Manufacturers News this week devoted to year-end statements (p 56) . . . High pressure contacts do not gall, permit wiping and resist corrosion . . . Capacitor-graded pothead suitable for low-pressure oil-filled cables (p 59).

MANAGEMENT ▶ **How well are your supervisors trained?** Probably not as well as they should—or could—be. The reason: There's a gap between any man's potential to do a job and his actual performance on that job. This week's Management Newsletter pegs the importance of the relationship between training and profits, and gives some guidelines on how to make your program a better one (p 47).

SELLING ▶ **Georgia Power will purchase and capitalize service entrances** of the homes it serves in a new, imaginative plan aimed at breaking the inadequate wiring bottleneck (p 51).

NEXT WEEK ▶ **Idaho Power uses closed-circuit TV for telemetering** indications of power interchange with another utility at a remote interchange point. System uses one of the microwave channels for transmission.

and therefore, they were not included in the U. S. costs. Had they been, however, the benefit-to-cost ratios would be reduced.

"Dependable capacity" of the combination of the tidal project plus the Rankin Rapids auxiliary is put at 550,000 kw; average annual generation at 3,063 million kwhr.

The political implications, then, become obvious:

- Unless there is a radical change in U. S. power policy, most of the U. S.'s share at Quoddy will go to preference customers, probably Maine's 10 municipals and five co-ops. The tremendous cost of the project in relation to the comparatively few people it would benefit may set a new ceiling on the amount the government is willing to underwrite in power costs to woo votes.
- Quoddy is strictly a power project. Except for recreation (not included in the study), there are no other benefits, such as flood control or irrigation. It could mean government in the power business on an electric power basis alone—a change in policy.
- Conceivably, if the U. S. paid for the entire project, non-preference customers would be helping to pay the freight not only for preference customers in Maine, but for Canadian users also. Washington, conscious of the recent strains on our traditionally good relations with Canada, is not likely to do anything that ultimately may become a diplomatic liability, however small.

What Quoddy seems to bear now, more than anything else, is careful watching. The political forces behind it are already being mustered, perhaps in the realization that the project, if it gets past IJC and on to Congress, will be one of the most important power issues in our history.

Nuclear Notes

Prices charged by AEC for enriched uranium fuel do not include a subsidy. They are, in fact, capable of future reduction, an atomic industry committee of the Atomic Industrial Forum has found. However, the study committee observed that: "interest rates have risen rapidly during the past four years, and, at the present level of interest rates, the use charge to the industry of 4% per annum does contain an element of subsidy."

There can be a supply of U_{235} available to support both required inventories and continuing burnup requirements for a commercial atomic power capacity of at least 40 million kw, the Atomic Forum committee said. Moreover, it concluded that no new major plant construction for U_{235} separation capacity will be needed for at least 15 years.

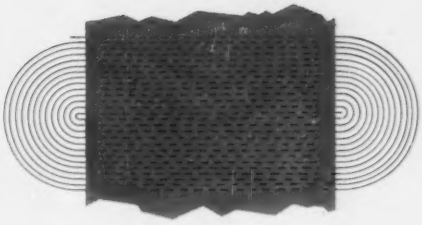
When aditional U_{235} separation capacity is needed a separation plant and the conventional electric capacity to supply it could be built to supply low enriched uranium fuel for 20 to 30 million kw capacity at a capital cost of $500 million. Such a plant would produce U_{235} at costs within the limits of existing AEC published prices for U_{235}.

An AEC examiner has recommended that a construction permit be issued to build the 22,000-kw Elk River, Minn., BWR but in the process rejected Minnesota Gov Orville Freeman's request that the permit be conditioned on compliance with state laws on atomic safety. AEC examiner S. W. Jensch said this issue could be raised when a hearing is held on whether an operating license should be issued. Construction of the reactor has been started under a previous tentative approval by AEC.

Production of the Elk River fuel elements amounting to $390,000 has been given to the Nuclear Division of the Martin Co of Baltimore. Allis-Chalmers Mfg Co is designing and building the plant for The Rural Cooperative Power Assn of Elk River. Martin-Nuclear will supply 170 bundles of 25 stainless tubes 5 ft long filled with ceramic pellets of uranium and thorium oxide. Complete core will include 480 lb of uranium oxide and nearly five tons of thorium compound.

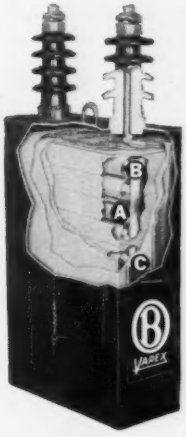
The Experimental Organic Cooled Reactor proposal of Fluor Corp, Ltd, has been selected by AEC for negotiation. The reactor will be used for experiments to develop economically-competitive reactors, cooled and possibly moderated and shielded by organic fluids (hydrocarbons). The EOCR will be able to operate at a power level of 20,000 (t)kw and 700 F, or a power level of 40,000 (t)kw and 500 F, as well as at intermediate power levels and temperatures. Atomics International will assist in the design of the nuclear portion of the reactor facility as a subcontractor to Fluor.

It's So Simple with Springs!



Schematic end view of Varex shows contact plate in relation to element. Note that each layer of foil contacts the plate at top and bottom.

Strong springs (c) maintain constant pressure on contact plates (b) to hold against extended foil (a).



VAREX spring-pressure system provides large contact areas outside active dielectric

An obvious design advantage in Varex capacitors is the method of making contact with the extended foil at the end of each element. Contact is maintained by strong spring pressure. This leads to these important benefits:

1 -- The electrical contact areas are generous in size and large in number. Every turn of foil is in contact both at the top and bottom of the plate. With this arrangement, current density at any single point is necessarily low . . . Varex units are better equipped to handle transient overcurrents.

2 -- With this system, winding each Varex element can be a continuous process -- uninterrupted for insertion of foreign materials to make electrical contact to the foils. A possible cause of mechanical damage to the paper dielectric is eliminated.

It's benefits like these -- adding to capacitor life and safe-guarding operation -- that argue strongly for using Varex capacitors on your system.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass

HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
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4963-H1

THIS SEAL

...what does it mean?.....

Three-phase Pennsylvania LTC equipment available

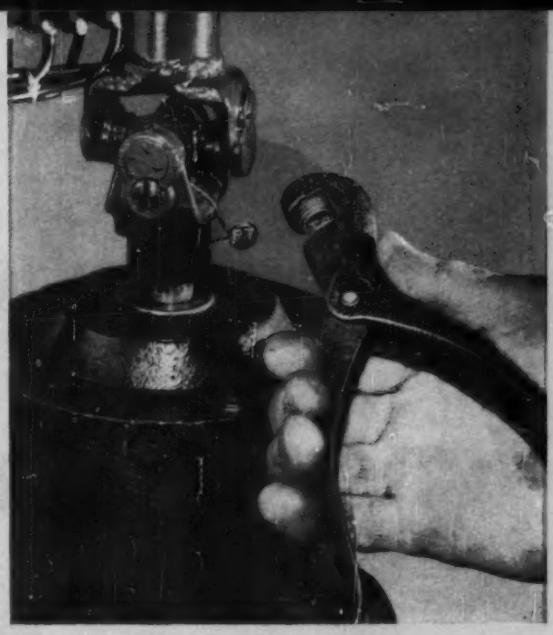
From:

120-kva step-voltage regulators or 750 kva LTC transformers

Through:

250,000-kva LTC transformers, autotransformers and regulating transformers.

... a disc of lead... a piece of wire... Alone they mean nothing. But, when the wire locks a Pennsylvania LTC driveshaft coupling, and the mechanism is sealed with the letters "PT" embossed on the lead disc... then these pieces of metal take on real meaning.



Load tap changing equipment *must* be assembled with painstaking care, for without proper assembly, the highest standards of quality in design and material specifications cannot assure correct operation.

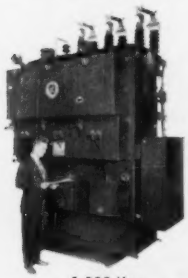
At Pennsylvania Transformer, C.A.A.D.—the Control Apparatus Assembly Department—is responsible for building LTC components, and also for their proper assembly on transformers and regulators. The PT seal, which is used in several places during the assembly process, represents C.A.A.D.'s seal of approval. In effect, it "seals in" the quality that has been attained upon completion of the following responsibilities:

1. Checking *all* dimensions of *all* machined parts against designs and standards.
2. Inspecting and writing individual check reports on *every* subassembly and assembly.
3. Conducting extended, automatic, service-simulated test runs of up to 5000 tap changes on every LTC assembly.

What does this seal mean to *you*? It means this: less trouble and lower costs—both at installation time and during the long life of our LTC transformers and regulators. The PT seal reminds you of our constant effort to build quality into all Pennsylvania LTC equipment.

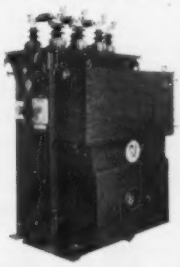
For descriptive information on both single-phase and three-phase regulating equipment, please request our Bulletin No. 81

Phase-Isolated LTC Transformers



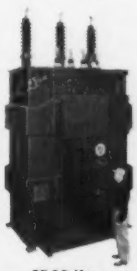
1,000 Kva

Three-Phase Step Voltage Regulators

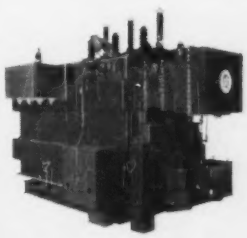


225 Kva

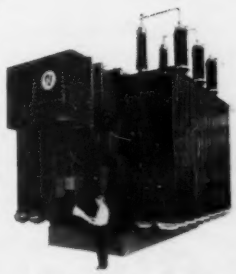
Three-Phase Load Tap Changing Transformers



2500 Kva



50,000 Kva



60,000/80,000/100,000 Kva

McGRAW-EDISON

PENNSYLVANIA TRANSFORMER DIVISION

McGRAW-EDISON COMPANY • CANONSBURG, PA. • Greater Pittsburgh District

CONVEYOR BELTS

NEW POWER PLANT USES 9 "U.S." CONVEYOR BELTS

Appalachian Power's new Clinch River steam generating plant at Carbo, Va. (started operating September, 1958) uses 9 "U. S." belts in its conveyor system for top automation and economy.

Following the shakeout operation, the coal is conveyed from the hoppers by two U. S. Giant® Feeder Belts (20', 48", 4-ply, 48 oz.). Receiving the feed is a U. S. Giant belt (490', 36", 4-ply, SN cotton-nylon) having a lift of 81 feet. Six other "U. S." belts are used in the system, designed to convey 1,200,000 tons of coal a year.

The U. S. Rubber "Coordinated Engineering" method of providing the right belt for the materials to be conveyed helps explain why "U. S." is the world's largest producer of belts—and explains why "U. S." Belts last longer, save you dollars. "U. S." engineers work with the manufacturers of the conveying mechanism and engineers of the plant, to insure you unfailing dependability.

• • •

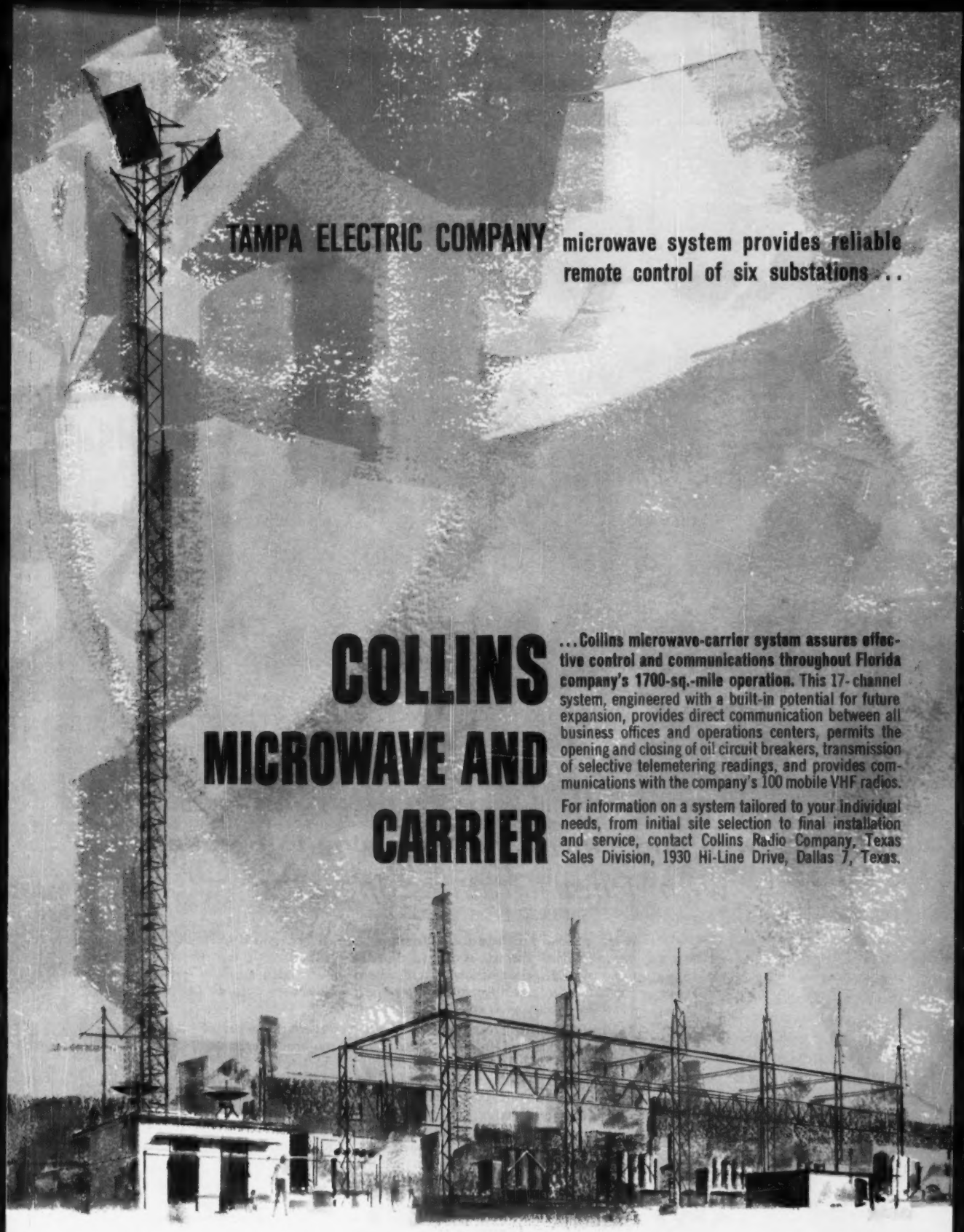
When you think of rubber, think of your "U. S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.



TAMPA ELECTRIC COMPANY microwave system provides reliable remote control of six substations . . .

COLLINS MICROWAVE AND CARRIER

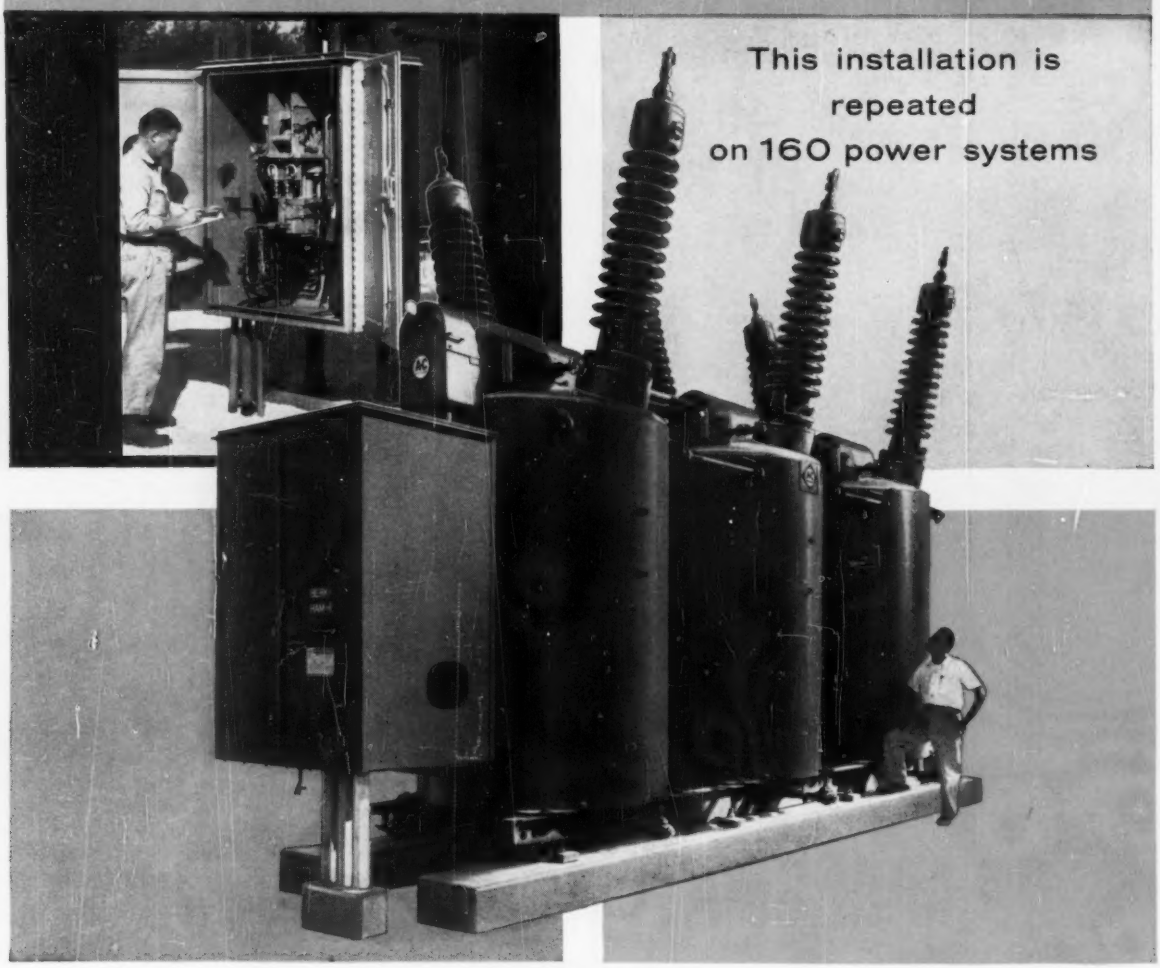
. . . Collins microwave-carrier system assures effective control and communications throughout Florida company's 1700-sq.-mile operation. This 17-channel system, engineered with a built-in potential for future expansion, provides direct communication between all business offices and operations centers, permits the opening and closing of oil circuit breakers, transmission of selective telemetering readings, and provides communications with the company's 100 mobile VHF radios.

For information on a system tailored to your individual needs, from initial site selection to final installation and service, contact Collins Radio Company, Texas Sales Division, 1930 Hi-Line Drive, Dallas 7, Texas.

COLLINS

COLLINS RADIO COMPANY • DALLAS, TEXAS • CEDAR RAPIDS, IOWA • BURBANK, CALIFORNIA

ALLIS-CHALMERS... Pacing Power Progress



It's well underway...the big swing to breakers

with Pneu-Draulic operators

Here's how confidence adds up. An innovation scarcely six years old has won the acceptance of 160 companies — and over 60% have placed repeat orders. That's the dramatic record of the reliable *Pneu-Draulic* operator available on Allis-Chalmers outdoor breakers (14.4 to 345 kv, 500 to 25,000 mva).

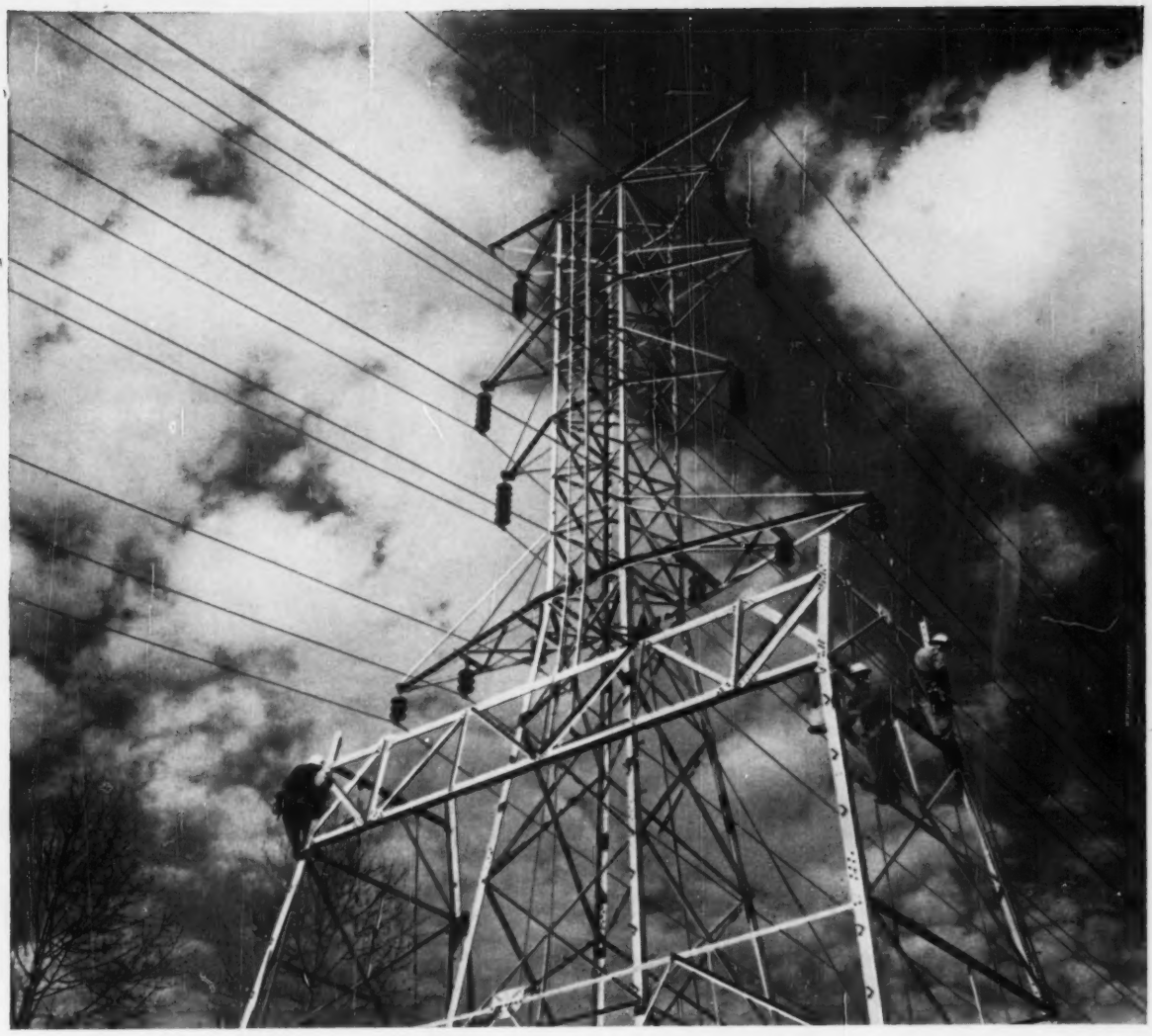
Reliable stored energy assures safe emergency closing of breaker at full rated speed onto energized line (even when no control power is available). Use of non-compressible oil instead of air ends use of trouble-causing anti-freeze solutions, eliminates moisture and corrosion problems. And, you get these additional benefits — mechanically trip-free operation, high-speed interruption.

Join the big swing to A-C breakers with low-maintenance *Pneu-Draulic* operators. Call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

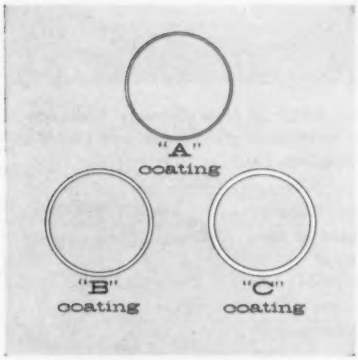
A-C ALLIS-CHALMERS

A-1205-E

Pneu-Draulic is an Allis-Chalmers trademark.



ACSR Core Wire Keeps High-Wires High



Bethanized Core wire is available in 3 coating weights.

Bethlehem ACSR core wire is the backbone of these high-tension wires. Built to withstand stiff winds and heavy weather, it furnishes dependable reinforcement and excellent corrosion-resistance when stranded into standard aluminum electrical conductors.

Manufactured to meet the latest ASTM specifications, Bethlehem core wire is available in three weights of Bethanized coatings. Bethanizing, our unique electrolytic process for coating steel wire with pure zinc, makes it possible to supply a coating weight double or triple the standard amoun of zinc.

Commonly furnished in sizes ranging from 0.1878-in. to 0.0661-in., it is shipped in coils of one continuous length. Coil weights are in accordance with ASTM specifications. The manufacture of ACSR core wire requires close attention to steel making practices and wire mill processes and is followed by careful inspection and testing.

A phone call to your nearest Bethlehem sales office will bring you further information on any of your wire needs. Or write us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

L-M'S PTLs were used to light this enchanting scene at the Ann Morrison Memorial Park in Boise, Idaho. Eighteen equally spaced 300 watt incandescent PTL luminaires, mounted on 20-foot aluminum poles, provide soft, low-level lighting for the gardens and walks surrounding the pool.

Line Material's New Post Top Luminaire Combines Beauty and Efficient Lighting

Line Material Industries, one of the nation's leading manufacturers of outdoor lighting, has combined in the PTL (Post Top Luminaire) charming modern appearance with soft, even illumination. It is specially suited for parks, schools, playgrounds, institutional grounds, driveways, parking lots, bus stations, or wherever elegance and efficient lighting are desired.

The PTL incorporates a rigid spun-aluminum reflector, an efficient glass refractor, and a sturdy aluminum mounting base. The hinged reflector swings open for easy maintenance. It is available for mercury vapor or incandescent lamps in five IES light patterns.

Get Complete Information

L-M Bulletin 58203 completely describes the PTL unit. Get this bulletin, and complete information or engineering assistance on L-M's full line of outdoor lighting, from one of the 77 nationally located L-M Lighting or Field Engineers; or write Line Material Industries, Outdoor Lighting Division, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Division of McGraw-Edison Company (Canada), Limited, Toronto 13, Ontario.

THE PARKING AREA at New Orleans' fabulous Fontainebleau Motor Hotel is also lighted with Line Material Post Top Luminaires.

The new Line Material PTL is available in natural aluminum or in pastel colors for 3- or 7-inch diameter mounting. It is also available with photo control. 420

LINE MATERIAL Industries *Outdoor Lighting*

McGRAW-EDISON COMPANY

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LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT

McGRAW EDISON

Liberal Earnings: A Utility Essential

Too many state commissions believe that utility earnings should be kept down to the minimum necessary to attract capital. Three Management Newsletters (Nov. 30, Dec. 7, and Dec. 14, 1959) have condemned the short-sighted attitude of regulatory bodies which puts this theory into practice, pares utility profits to the bare bones, and thereby throws a serious hitch into the progress of a vital part of the nation's economy.

This preoccupation with holding down earnings already has derailed many railroads and may verge on throwing a few airlines into a spin. Its prevalence today in electric utility regulation is one of the least encouraging aspects of the industry's future.

The most serious regard of the problem lies in the inability of utility management to get this point over to the commissioners. Of all the groups with whom the commissions have to deal, only company management is in possession of the complete facts and the whole story of the possible consequences. Surely consumers are untrained in utility economics, and further hardly can be expected to shout for joy at the prospect of higher electric bills. The commissioners themselves are even *less* pleased about raising rates.

If the management of a utility company, or any company for that matter, cannot think of ways to use liberal earnings to work for the ultimate good of the customers, and ways to get this across to regulatory bodies, it may suffer in the future in a way akin to the railroads.

Managements know there are projects afoot and others bidding for attention which could speed up cost-saving progress in generation, transmission and distribution—if more funds were available to finance them.

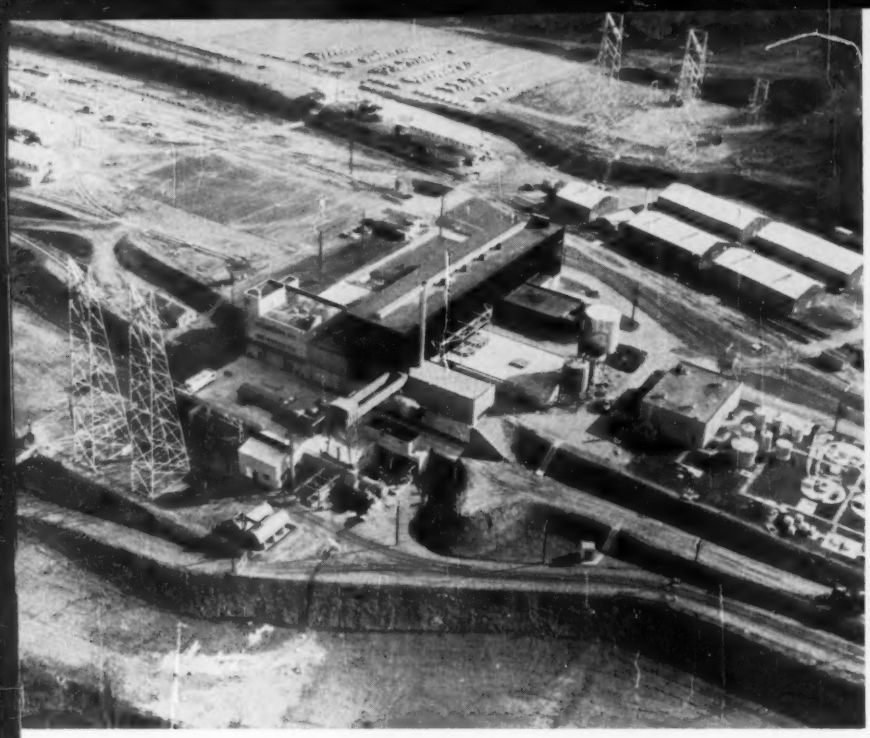
Managements know they have been inhibited in selecting the most attractive *long-term* alternates in some expansion plan studies by this philosophy which practically dictates acceptance of the plan with the *minimum* risk. They also know that industrial America has grown to today's stature by a different philosophy: one that puts a premium upon *studied* risk. But such an approach requires more flexibility in financial matters than utilities currently are allowed to exercise.

Managements know that there is about $12 billion worth of modernization that could be done in electric and gas utilities in replacing obsolete plant. But even with the help of an exceptionally rapid growth rate since World War II, the electric companies have been unable to maintain the value of their equity.

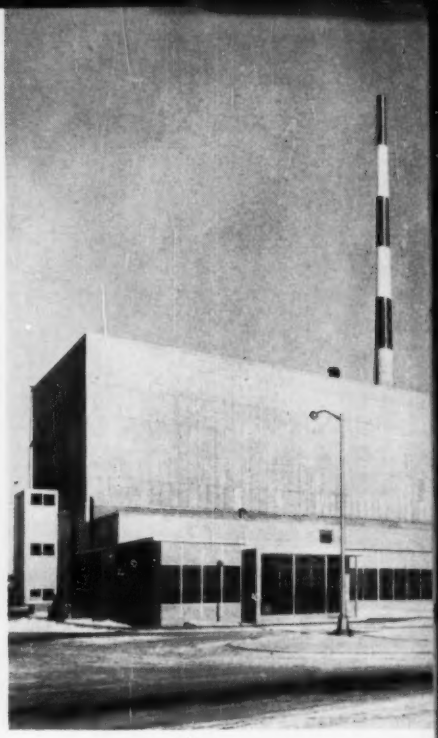
What can the managements of electric utilities do about it? The most important thing is to start now working out long-term programs to convince their state commissioners that profits are needed in the utility business just as they are in any other business.

This will require a change in attitude on the part of some of the managements themselves.

Specifically, and concurrently with the above, the utilities should urge the long overdue adoption of fair value rate bases in rate making. They should press strongly for economic depreciation, insisting that any tax relief thereby granted should not be handed to consumers in form of petty rebates, but should be invested in research and improvements which will benefit the customer more in the long run.



Shippingport celebrates its second anniversary . . .



Dresden postpones its

Five-Utility Reprocessing Study

- Chemical firm will weigh feasibility of small plant to reprocess 'compatible' fuels. Study is called a logical and necessary step in the economics of nuclear power
- Good news marks Shippingport's second anniversary
- Second start-up of Dresden is scheduled for January

The closing days of 1959 were eventful ones in the utilities' nuclear power development program.

Shippingport marked its second anniversary with some good news, and Dresden's return to criticality was rescheduled for January.

Most significant of all, late in December five utilities joined with a chemical company in taking what could be the first step toward a privately-owned reprocessing plant for spent nuclear fuels.

The five utilities are: Commonwealth Edison Co, Consolidated Edison Co of New York, Detroit Edison Co, Northern States Power Co, and Yankee Atomic Electric Co. The chemical company is the Davison Chemical Division of W. R. Grace & Co, Baltimore.

The six companies announced Dec. 22 the formation of Industrial Reprocessing Group (IRG), whose mission it is "to undertake a study of the technical and economic feasibility of the design, construction, and operation of a privately-owned facility for the processing of spent nuclear fuels."

No government funds are involved. The cost of the study, which has been estimated at approximately $250,000, will be shared equally by the six companies.

The study will be carried out under the direction of Davison Chemical. It will take about six months.

The importance of the study stems from the fact that fuel reprocessing is the only one of the several steps in the nuclear fuel cycle that cannot now be done by private industry.

All reprocessing today is done by the Atomic Energy Commission in large installations such as Hanford, Savannah River, and Arco. Up to now this task has seemed uneconomic for the chemical companies.

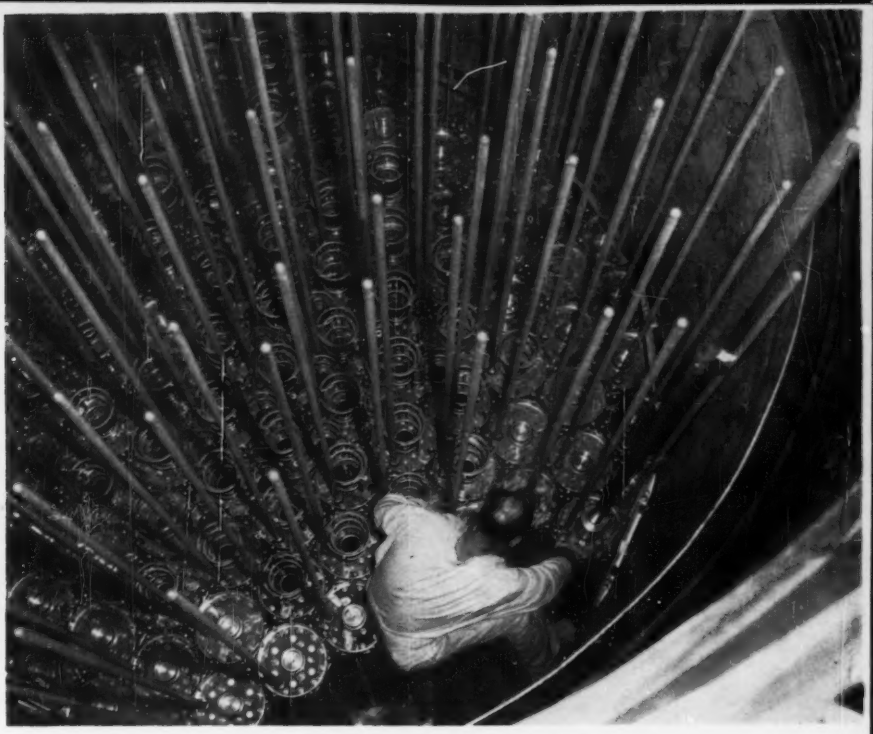
It's no secret that AEC has for some time been anxious for chemical companies to get into reprocessing in order to break up the government's monopoly and at the same time reduce the government's expenditures for the purpose.

Formerly, however, there have been no takers. The amount of business that could be expected from the few nuclear power installations in operation or about to go into operation did not justify the large capital expenditures necessary. And the wide variety of fuels now being considered also complicated the issue.

The formation of IRG is the first indication that a privately-owned reprocessing plant may be approaching economic feasibility.

Speaking for the utility com-

return to criticality . . .



And nuclear fuel makes hot news elsewhere, as . . .

Highlights a Big Month for A-Power

panies, James F. Fairman, senior vice president of Con Ed, said that the study was an outgrowth of the desire of utility companies involved to explore the technical and economic feasibility of having their spent fuel elements processed in a privately-owned facility.

Would Not Handle All Fuels

Fairman said that the IRG study differs from previously discussed plans for reprocessing in that it contemplates a small plant, capable of handling a few "reasonably compatible" fuels, but making no attempt to reprocess all nuclear fuels now in use.

He emphasized that the study and the formation of IRG involved no commitment to build such a plant, but noted that Davison Chemical felt they "had something," and that the five utilities obviously thought enough of it to finance the study.

Another source also stressed the tentative nature of the study, but added that several other utilities were watching IRG with interest, and "might join later."

Although no government approval was necessary in order to make the study, IRG submitted a proposal to AEC requesting information on the agency's fuel reprocessing operations and development programs with particular emphasis on power fuel processing. The proposal was approved by the commission and the data will be available for the study.

But the study will not be limited to ground already covered by AEC. Fairman said the AEC data would be used to eliminate approaches that had already been proven infeasible and to make use of any "good tips that had not yet been checked out."

Regardless of its results, the study is considered by the participating utilities to be "a logical and necessary step in determining the overall economics of the utilization of nuclear fuel for the central station generation of electric power."

Meanwhile, the expected date of Dresden Atomic Power Station's return to criticality was pushed into January. Officials of General Electric Co, prime contractor of the Commonwealth Edison power plant, had previously anticipated that Dresden's second start-up would occur during December.

GE technicians are now working out a method of reducing stress on the shear pins which presumably were the initial source of trouble that led up to the reactor's shut down Nov. 6. Inspection of fuel elements was proceeding on schedule.

Shippingport Two Years Old

And at Shippingport, Pa., the first large-scale nuclear plant devoted to civilian power generation marked its second anniversary Dec. 18. On that date in 1957 Shippingport station came on the line and sent its first kwhrs to help serve the Pittsburgh area through the lines of the Duquesne Light Co.

Shippingport's first fuel core was replaced last month, and its performance exceeded expectations. The first "seed" had lasted 5,806 hours at full power instead of its expected life of 3,000 hours. The second seed is expected to have an even longer life.

Joint Columbia Development a Step

International Joint Commission recommends a 50-50 sharing of downstream benefits; Canada gets her way on most points

An agreement by the International Joint Commission may have broken the log jam holding back Canadian power development on the upper Columbia River.

This agreement between U. S. and Canadian representatives on the IJC still must be approved by the two countries, but at least a presentable plan has been worked out. Generally, the IJC agreement is simply a principle to be followed in joint development of the upper Columbia. Final agreement would be in the form of a treaty setting out the principle as well as specific plans for individual projects.

According to Gen A. G. L. McNaughton, co-chairman of Canada's IJC, the potential power benefits of Columbia River development in both the U. S. and Canada total about 16-million kw.

Canada gets her way on most points in the bill of basic principles. These include:

1. A guarantee of Canada's right to develop her portion of the Columbia as she wishes—but without diverting flows to other watersheds.

2. A question as to the development of the authorized Libby Dam project (on the Kootenai River) in the U. S.

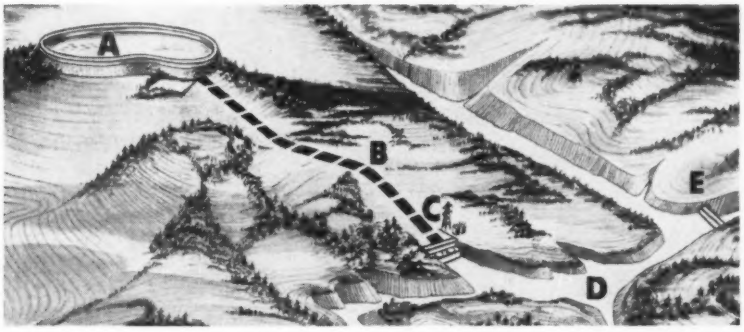
3. An assurance that Canada will get half (provided it's equitable to both countries) the additional hydro power that her upstream development of the Columbia will enable U. S. plants to produce.

4. Cash payments—not power—to Canada for 50% of the U. S. flood-control benefits derived from Canada's upstream storage projects—the term of years still undetermined.

Canada's Mica Creek project (1.6-million kw) stands to gain the most from IJC recommendations. This $310-million project, located at the northern-most bend of the Columbia, could be under construction by 1961 if the two countries wrap up a Columbia treaty as rapidly as IJC came up with its recommendations.

However, a couple of obstacles loom in Mica Creek's path:

• The possible, alternate construction of a 3,145,000-kw, $630-million project on the Peace River, farther north in British Columbia. This project, promoted by Swedish financier Axel L. Wenner-Gren and



Contract Let for Pump-Storage Project

Union Electric Co has awarded a $20-million construction contract for the recently announced Taum Sauk pump-storage project. Fruin-Colnon Contracting Co of St. Louis and Utah Construction & Mining Co of San Francisco will jointly build the 50-acre upper pool (A), a 1-mile long, 26-ft dia water tunnel (B) connecting the upper pool with the 350-Mw pump and generating station (C), the lower pool of 370 acres (D), and the dam impounding water in the lower pool (E).

Another $30 million will be spent by the utility for equipment, design, the transmission system, lands and rights of way. The project site is near Lesterville, Mo., on the east fork of the Black River in Reynolds County. Completion target date is in the spring of 1963.

It will take about 3 kwhr of nighttime generation to pump the water required for 2 kwhr of daytime production, UE said. The economies of pump-storage will permit the company to defer for two years the start of construction for a steam plant elsewhere on the system.

Senator Moss

. . . stressing hydro, EHV, and river development. EEI, Bayard England refutes it

A coming report on Soviet power developments picked up a full head of steam last week when Sen Frank Moss (D-Utah), who headed an 11-man tour of U.S.S.R. facilities, revealed some of the highlights of the report which will be submitted to the Senate Interior and Public Works committees.

This 175-page report—due in early January—will stress the need for stepped-up U. S. development of hydro power plants, high-voltage transmission grids and maximum use of river basins.

"Unless we speed up or they (Russia) slow down," said Moss, the Russians "could" overtake us in 1975. And he added that the U.S.S.R. could also surpass this country in power used by industry by 1973—because the Soviets supply more power to industry, percentagewise, than we do.

Nearer

the Peace River Development Co, would flood the area with power, making Mica Creek unfeasible.

However, Peace River has its obstacles too: a lengthy 500-kv transmission line to Vancouver would be required; considerable exports of power to the U. S. also would be needed to make the project pay out. And these exports are against present Canadian policy.

Premier Bennett said British Columbia needs both projects, and that the IJC principles do not alter his government's favorable attitude toward Peace River.

- It still is uncertain who'll build Mica Creek—the province, B.C. Hydro Commission, or private firms.
- Bureaucratic delays could block signing of a treaty between the U. S. and Canada for several years. Canada is anxious to conclude the treaty so it can get started on Mica Creek, but the U. S. might drag its heels, even refuse to sign the treaty, if Canada exercises its right under terms of the IJC recommendation to block construction of Libby Dam.

Since Canada would be promised the right to develop her rivers as she wants, she could build a major project (Door Dam) on the Kootenai just over the border upstream from Libby, thereby killing feasibility for the authorized U. S. project. Power facilities at Mica Creek may not be built for many years to come. But U. S. power payments to Canada (about 1-million kw) resulting from the dam's improvement of U. S. river flows give Canada a large block of power anyway.

U. S. payments to Canada for flood control benefits would amount to between $4 and $5 million yearly. A 35-year payment period (recommended by IJC) would return about $150-million to Canada to recompense her for a projected 14-dam, $1-billion development on the Columbia in years to come.

Preference Clause Applies, BPA Intertie Report Says

The Bonneville Power Administration preference clause would apply to customers in California if Columbia River power is marketed there over a proposed intertie. This is the finding of an Interior Department solicitor in a review report released by BPA recently.

The report says comparative studies indicate the California tie lines should be 230 kv rather than 345 kv. One 230-kv line from Klamath Falls, Ore. to Pit No. 3 near Redding, Calif. was found feasible, assuming excess BPA power would sell for present rates in its service area.

A tie with the Central Valley yields no increase in critical year capacity for the two systems through use of surplus secondary energy, the report adds. Governors and consulting groups in the region are reviewing the report before it goes to the Senate Interior Committee.

Reveals Highlights of Soviet Power Report . . .

The conclusion that the Russians could overtake the U. S. in power capacity has been challenged by Edison Electric Institute and authorities in private utility circles. B. L. England, board chairman of Atlantic City Electric Co and past president of EEI, in a statement to the press, projected a 200-million kw gap between the U. S. and Russia by 1975.

He said Russia would have a capacity of 320-million kw compared with this country's 520-million kw.

Moss emphasized that electric power production is "the basic field in which supremacy counts heavily in peacetime economic competition or in event of war." He added that Russia has "caught up with the rest of the world in the general field of hydroelectric development," and, "in fact, they are actually pre-eminent in certain specific aspects of such development."

The 11-man delegation of which Moss was the leader spent a month in early fall touring Russian power developments, and its report is expected to push strongly for greater federal development of U. S. power operations—principally because the group was stacked heavily with public power advocates.

Stresses Four Points

Among points which Moss picked out as most important in the coming report are:

- Soviet development of high-voltage transmission lines—400- to 500-kv lines in use and 1,000-kv lines under study. "The Russians plan to complete, before 1965, five integrated transmission systems, and to tie these together later into an integrated national network."
- Russia "has undertaken literally hundreds of new starts on hydroelectric developments within the past five years." And, he points out, the U.S.S.R. will keep its ratio of hydro power production at 20% of its total during the future—while that of the U. S. falls from 20% today to 15% by 1975. Russia has two operating hydro plants larger than Grand Coulee, and two more, even larger, are under construction. And hydro generators up to 500,000 kw each are planned. The Ichang Gorge Dam, on the Yangtze River in China—planned for 15-million kw in World War II—is being upped to 25- to 40-million kw.
- "The U.S.S.R. is exporting heavy power equipment to more than 20 countries, some of which the U. S. formerly served."
- "Atomic power is not expected to supply significant amounts of power during the next few years in either country."

England noted that Moss' group has not mentioned that "America has about three times the hydro capacity of Russia." He further noted that Khrushchev has placed greater emphasis on steam for the future. "The Russians have found, as have we, that, with few exceptions, electric power can be made more economically from steam."

The U.S.S.R. has an area of 8.5-million sq miles served by 62,000 miles of transmission lines 35 kv and above while the U. S., with only 3-million sq miles, has 240,000 miles of lines 35 kv and up.

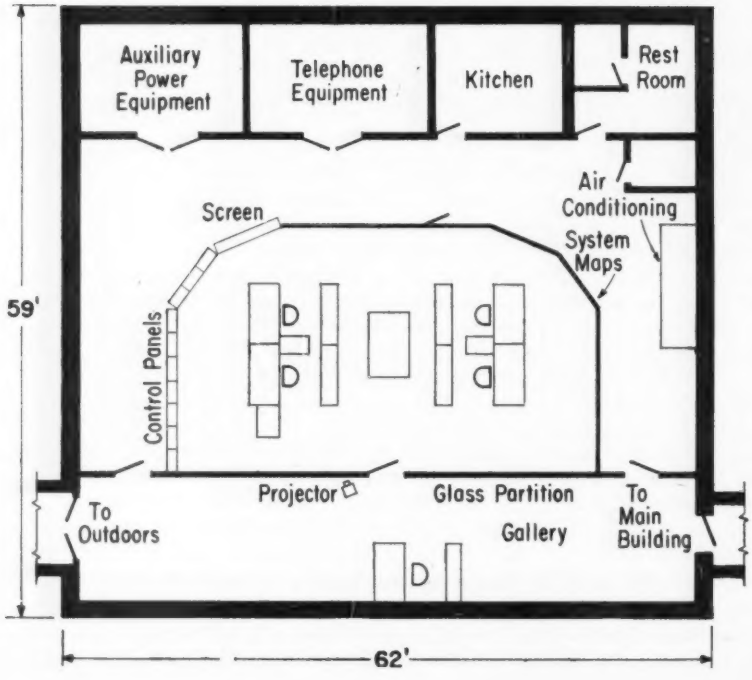
Bomb-Resistant

- Air and water supplies, kitchen and sleeping facilities, and food storage will permit operation under most abnormal conditions

- Features include finger-tip 'phone control and a projector that replaces panel maps

H. G. CARPENTER, General Power Control Supervisor, Consumers Power Co, and
K. F. KALSOW, Electrical Engineer, Commonwealth Associates, Inc, Jackson, Mich.

DETAIL MAPS are flashed on 6-by-6-ft screen when dispatcher presses button calling for one of 50 slides showing sections of system. Center layout is shown below



Power control supervisors at Consumers Power Co's new underground control center will have most of the comforts of home plus the protection of a bomb shelter. The facility is next to the recently completed central operations headquarters, five miles from midtown Jackson, Mich.

Believed to be the nation's first completely self-sustaining underground center of its kind, the structure is designed to operate in a sealed condition if an emergency arises. To help make it self-sufficient there is a self-contained air supply and an air conditioning unit, an independnent deep well water supply and sump pumps. There are kitchen facilities with well-stocked food lockers, plus roll-away sleeping equipment.

The 59-by-62-ft center was built of reinforced concrete and designed to withstand a high impact.

50-Kw Unit Serves as Stand-by

An automatic 50-kw auxiliary engine generator unit supplies emergency power for facilities, including control instruments, communications, lights and pumps. Normally, the unit is operated from natural gas, but can be quickly switched to a stand-by supply of LP gas.

Entrance to the power control center is through an underground

Control Center Is Self Sustaining

REGIONAL MAP aids dispatcher; control supervisor has finger-tip control of communications with modified 508 PBX

passageway from the main building. All connecting steel doors are monitored and electrically controlled. An emergency exit leads to the ground level.

The office of the general power control supervisor is at the entrance to the passageway in the main building. From here, supervision of all power control operations is carried on. Duplicate facilities for the general supervisor are available in the gallery. The gallery is separated from the center by a glass partition, which permits visitors to observe the control equipment and activities without distracting personnel. Future expansion will utilize the space now occupied by the gallery.

The 78-ft steel panel board is arranged in a semicircular shape and was especially designed for maximum reading efficiency.

Fifty feet of the board contains two system maps which are taped on with color-coded acetate tape. The 138-kv bulk power transmission lines, together with the substation layouts, are on one part of the board. On the other portion there is a map of the southern region bulk power transmission lines with all sectionalizing points. Maps are arranged so that changes and future expansions can be made easily.

Recording and control instruments that automatically compute the system's generation are located in 10 control panels which are directly in front of the power supervisor's desk. The instruments automatically send the calculated system generation information over telephone lines and carrier to the various generating stations for automatic corrective control action.

Also on these control panels are extensive weather indicating instruments and the Conalrad warning system.

Up-to-the-minute information on weather conditions, including forecasts of severe weather, is available to dispatchers over teletype connections to the U.S. weather reporting agency.

Conventional Maps Replaced

A specially-designed projector and screen replaces the conventional roll or panel maps for showing details of areas and switching schemes.

The 1,000-w projector has a slide magazine loading and solenoid indexing mechanism which allows the power control supervisor to select and project any one of 50 detailed portions of the system map on a 6-by-6-ft screen.

The map to be projected is chosen with a push-button selector which is located on the supervisor's desk. The selector has two rows of buttons, a decade row with buttons numbered from 0-5, and a digit row with buttons numbered from 0-9. By pressing a combination of one button in each row, the supervisor makes his selection. The projecting magazine rotates directly to the selected slide without intermediate stops.

Modified 508 PBX telephone equipment, especially designed for the finger-tip control of all communications, including the mobile radios and interoffice communications, is centered in four turret-type desks. This equipment also controls the lighting for the office and the slide projector.

Telephone circuits carrying the voice, telemetering and the control circuits from the center are divided between two separately routed underground cables assuring continuous service to the center.

Harmonizing pastel colors, used throughout the office, produce a cheerful and restful effect.

Panel boards were finished a mist green, the telephone turret desks, control console, worktables and files were finished a suede brown. The floor is a light colored asphalt tile flecked with black.

Fluorescent lights mounted over a false "egg crate" ceiling provide a high level of diffused light which can be regulated to any intensity by the operator.

The "egg crate" ceiling also serves as a sound diffuser, holding noise level in the control center office to a minimum.

Preference Group Pushes Federal Grid . . .

. . . for Colorado River Project. Upper Colorado Basin Preference Users Assn resolutions oppose private utility grid

The Upper Colorado Basin Preference Users Committee has declared that "a federal grid will best meet the requirements" of the Colorado River Project Act.

The preference group's position is in direct opposition to a proposed transmission system by investor-owned utilities (EW, Nov. 30, 1959, p 86). The stand was taken at a meeting in Denver of the committee, which includes REA officials from Colorado, New Mexico, Utah and Wyoming.

Howard E. Scott, committee chairman, made public two resolutions. The first stated: "This committee has presented to the Bureau of Reclamation, the Department of the Interior, and the Congress data on preference power demand approximately equal to output of the project and has recommended a federal system to most effectively meet requirements of the project act and most economically deliver power to the users . . .

Four Decisions Urged

"All users have urged decision by the Secretary of Interior on four key points; namely, 1) project market area, 2) tentative power allocations, 3) line size and location and 4) load center location."

The resolution continued: "Whereas, the Congress has required such determinations, and

"Whereas, the only presentation made to users by the Bureau of Reclamation did not involve any of these decisions, and

"Whereas, the investor-owned utilities of the area have presented a possible system to the bureau and to the preference users, and

"Whereas, these developments have added little to necessary decisions,

"Now, therefor, be it resolved by the Upper Colorado Basin Preference Users Committee that it advise both the bureau and the investor-owned utility group that in its judgment the presentation of said utilities does not constitute a firm proposal, because it is not based on a determined market area or allocations of project power and does not contain definitive proposals regarding quantities, costs, or terms and conditions under which power would be wheeled or delivered to preference users . . ."

The groups plan to make an engineering survey, which it feels will show that a federal grid will best meet the requirements of the Act.

The second resolution said:

"Many preference users in the area are located in an island of high-cost wholesale power, or are in need of additional power supplies at reasonable rates to meet existing commitments,

"Now, therefore, be it resolved that the Upper Colorado Basin Preference User Committee urge the Secretary of the Interior to designate the states of the upper division of the Colorado River as the primary marketing area of the project, a designation in accord with the recommendations of the states themselves."

Month-long I&M Electric Co Strike Ends

Acceptance by Local 12,530, District 50, United Mine Workers, of the original contract offer of Indiana & Michigan Electric Co on Dec. 16 ended a month-long strike of some 400 physical employees in the utility's South Bend Division and at the Twin Branch generating plant in Mishawaka.

The new two-year contract, expiring Oct. 31, 1961, provides for a 4½% wage increase, a three week vacation after ten years of service instead of the former 12 year requirement, an increased shift premium and a wage reopening after one year. The company had already placed into effect prior to the strike the 4½% wage increase effective November 9 but the other items were effective December 16, the date of the signing of the contract.

Court Insures Peaceful Pickets

As a result of court action instituted by the company a stipulation was agreed upon providing for peaceful picketing during the strike. The company's supervisory personnel maintained service to customers on a normal basis throughout the walkout. Prior to the signing of the new contract, I&M discharged one employee and suspended for one week a second employee for misconduct on the picket line.

The physical employees on I&M's Marion-Muncie Division, represented by Local 1821 and 1822 International Brotherhood of Electrical Workers, had previously signed a new two-year contract with the company with wage reopening after one year, calling for the same wage increase and benefits (as offered South Bend) effective December 1. In addition the physical employees in the I&M Fort Wayne Division represented by Local 1392, IBEW, also signed a similar two-year agreement, with the same wage increase, benefits and wage reopening after a year, effective Dec. 15.

UWA Contract Reopened

A two-year contract with the Utility Workers Union of America Local 418, representing physical employees at the Tanners Creek generating plant in Lawrenceburg, Ind., was opened for wages only, and an agreement was reached incorporating the same 4½% wage increase, effective Dec. 15.

A strike was called on Dec. 1 by Local 13094 District 50, United Mine Workers representing I&M clerical workers in its South Bend Division and at the Twin Branch generating plant; but many of the clerical employees ignored the pickets and returned to work immediately, and all returned to work by Dec. 14. A 4½% wage increase was put into effect Dec. 1 for these clerical employees and the remaining benefits will be effective when the contract is signed.

OVER-ALL VIEW shows the new Camden area distribution headquarters of Public Service Electric & Gas Co built at Moorestown. The 29-acre site has housing for substation, meter, line, service, storeroom and clerical departments

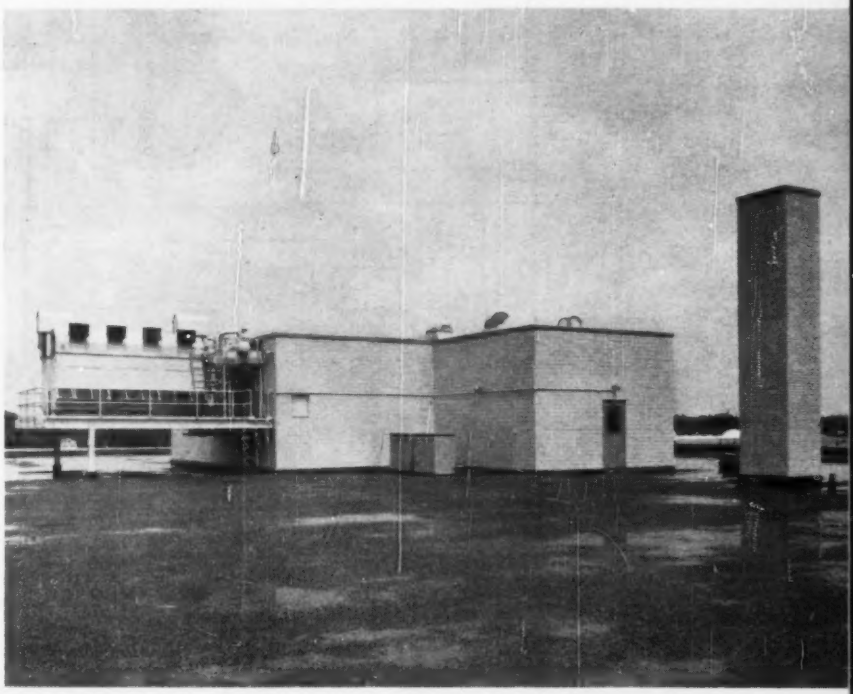
Heats, Cools Moorestown Center

Air-source heat pump has capacity for air-conditioning 29-acre distribution headquarters for the Camden Area

LOUIS TEITELBAUM, Assistant to General Superintendent of Distribution, Public Service Electric & Gas Co, Newark, N.J.

A compound compression air-source heat pump heats and cools the new electric distribution headquarters of the Southern Division, Public Service Electric & Gas Co, at Moorestown, N. J. Here are consolidated the electric distribution operations for the Camden and Burlington districts.

The air-conditioning system, needing only electricity to run its equipment, extracts heat from the outside air, even in below-zero weather. This heat is raised to a usable temperature by refrigerant compression and used to produce hot water for circulation to the fan coil air-conditioning units. The same



HEAT PUMP INSTALLATION is the compound compression air-source type with capacity of 147 tons of summer cooling and 1,269,000 Btu per hr in winter

equipment cools the headquarters' structures in summer.

The total air-conditioning plant has a capacity of 147 tons of summer cooling and 1,269,000 Btu per hr for winter heating. Each of two identical systems consist of a 75-hp, high-stage, eight-cylinder, 1,174-rpm compressor and a 60-hp, low-stage, 16-cylinder, 1,173-rpm unit; an outside air cooler (evaporator condenser); one shell-and-tube water-cooler heater; one refrigerant receiver; and, a low-pressure surge drum.

An auxiliary shell-and-tube condenser in System A, the "lead system," provides hot water for air reheat during the cooling season. Hot or cold water is circulated to the air-conditioning units by a 15-hp pump. And the entire heating-cooling installation is controlled automatically by a data center and control system, which actuates the pneumatic valves for switching from heating to cooling, or the reverse.

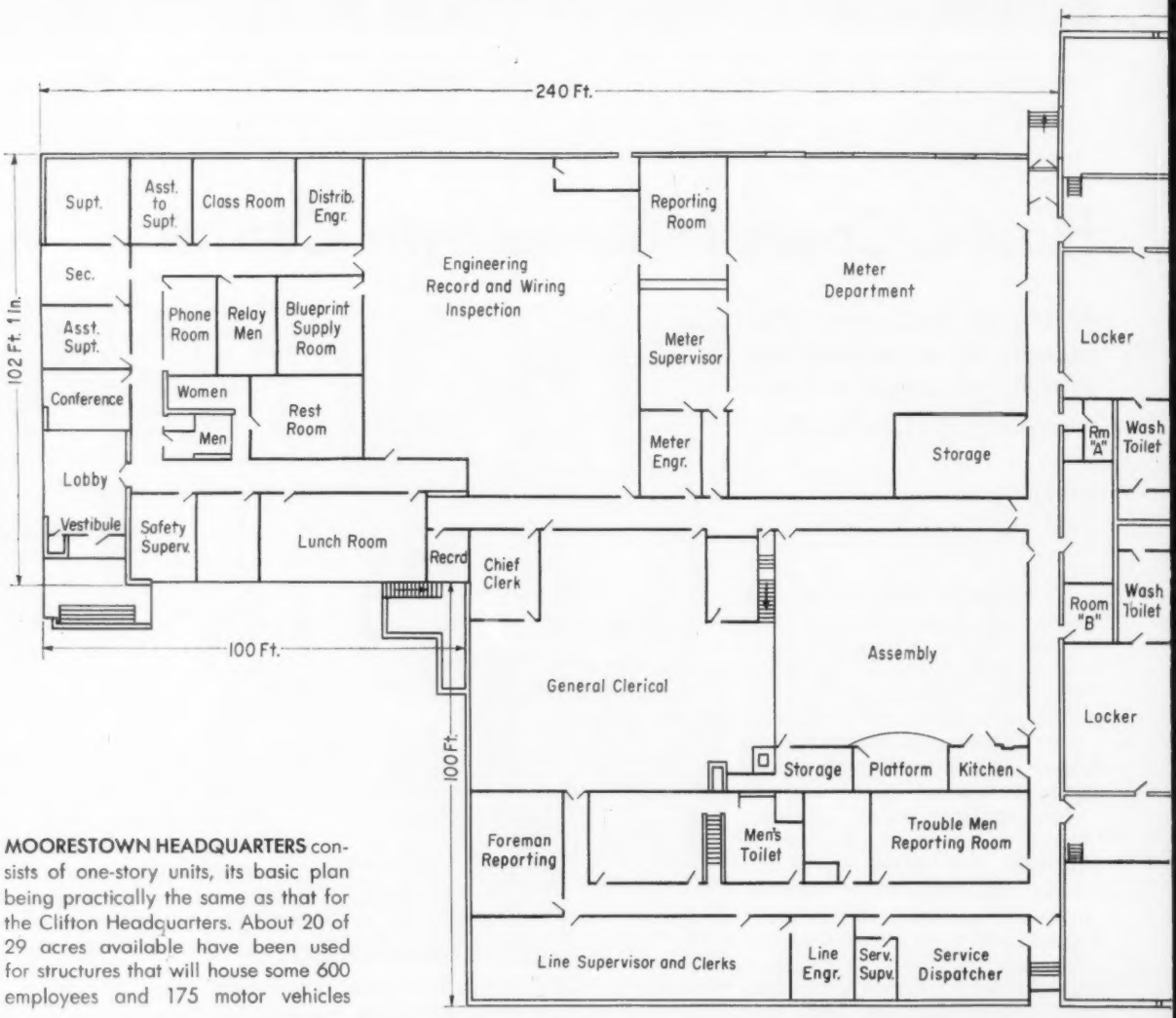
20 Acres in Use

Outdoor temperature determines which basic operating cycles, heating or cooling, is in effect. The heating cycle uses either single or two-stage compression, as governed by outdoor temperature.

The building thus air-conditioned is comprised of one-story units almost identical with those at the company's Passaic Division headquarters at Clifton. The basic plans of both, being practically the same, could serve as a layout for future headquarters' construction. The Moorestown site has 29 acres, about 20 in use.

Some 600 employees, including substation, meter, line, service, storeroom, and clerical department personnel, report at these headquarters, where about 175 vehicles are maintained.

The main structure houses the supervisory force, substation, meter, line, storeroom, and clerical departments. There is a covered storage area for cable, wire, crossarms, and other equipment needing weather protection. In a separate building automotive equipment is repaired, and there is a shop for testing and



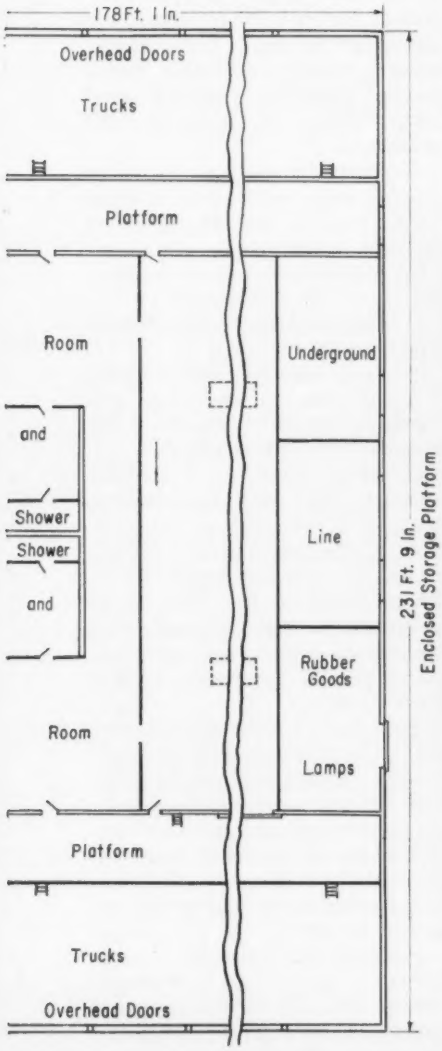
MOORESTOWN HEADQUARTERS consists of one-story units, its basic plan being practically the same as that for the Clifton Headquarters. About 20 of 29 acres available have been used for structures that will house some 600 employees and 175 motor vehicles

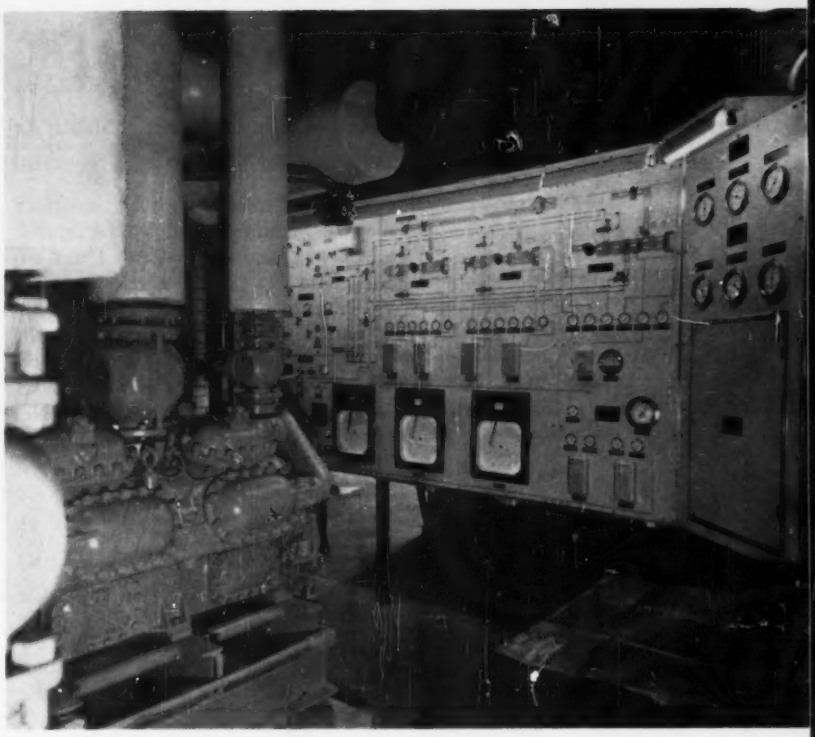
repairing transformers and other items not large enough to return to manufacturers for such servicing.

Loading platforms adjoin the storeroom area, so that night loading of trucks can be carried out with a minimum of material handling. A pole yard with racks is at the site, and a crane is available for night loading.

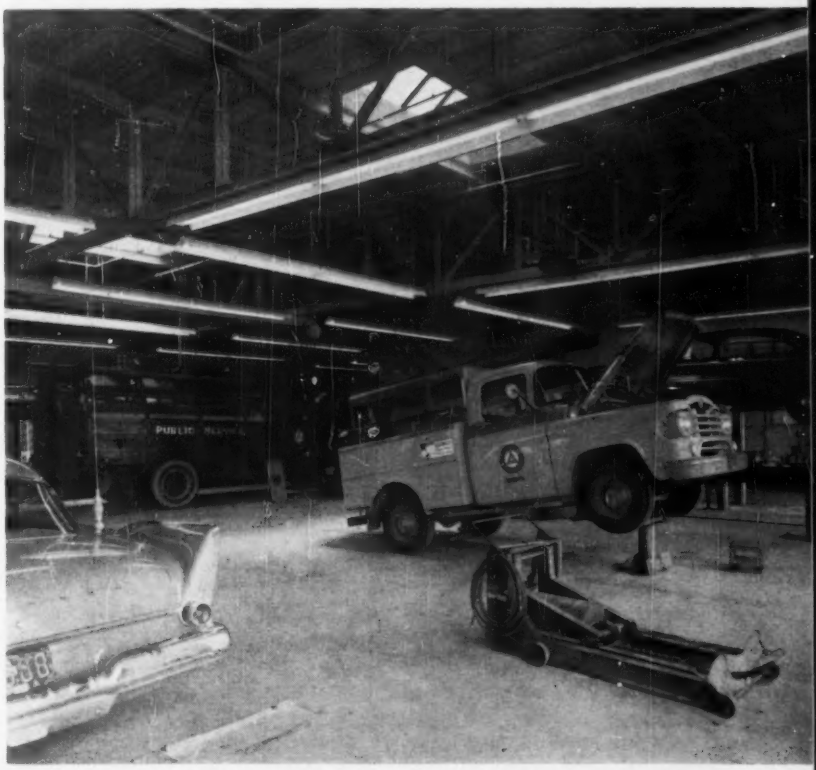
Much of the yard has been paved for the parking of employees' automobiles, and there is an employees' lunchroom. There is also a large assembly room for group meetings and safety lectures.

The storeroom area has modern bins, racks, and fork-lift trucks for transporting material and equipment.





DATA CENTER and control system control the heating-cooling installation by actuating pneumatic valves for switching from heating to cooling, or vice versa



FACILITIES at Moorestown can be used for maintaining about 175 vehicles. In automotive repair building there is also a shop for repairing transformers

Computer Cites No. 2/0 Aluminum

Study with IBM 607 embraces three secondary conductor configurations, customer demands and load growth rates

H. T. HOFER, Standards Engineer,
J. C. SMITH, Engineer,
J. C. BOUTON, Engineer, Public Service Co of Colorado, Denver, Colo.

No. 2/0 aluminum cabled type secondary proved in a computer study to be the most economical size and type for present and anticipated loads on the Public Service Co of Colorado system. The study determined the most economical secondary conductor size and type and transformer spacing for present and anticipated loads. The digital computer saved engineering manhours and gave the study a scope not obtainable by other means.

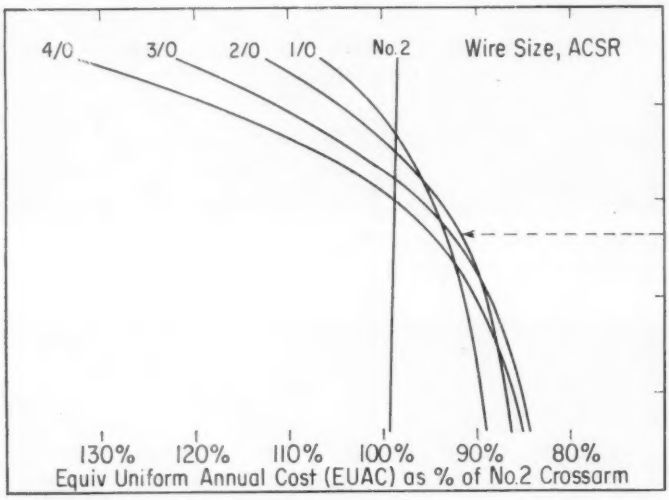


FIG 2—NOMOGRAPH SECTION shows final values in calculation of rack secondary economics when substituted in Fig 1

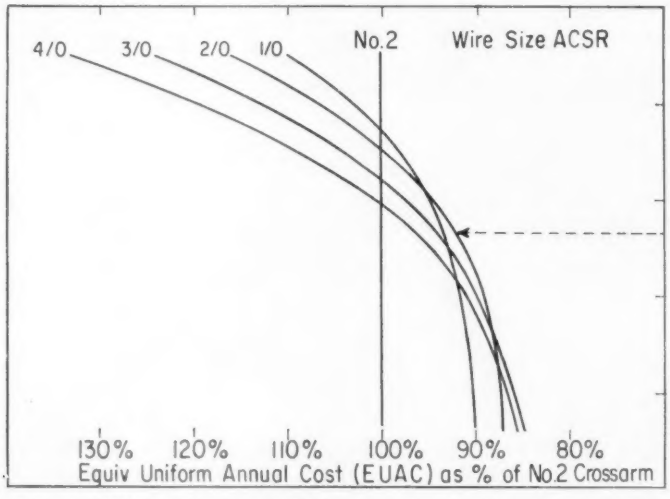


FIG 3—NOMOGRAPH SECTION shows final values in calculation of crossarm type secondary economics when substituted in Fig 1

Public Service's study of economics of the transformer-secondary combination was undertaken because No. 4 copper or equivalent secondary on crossarms had been its standard for more than 30 years, adopted when the average annual use per residential customer was 350 kwhr. Transformers then were spaced one per block, or one every other block. Today the average annual kwhr use per residential customer is 2,500. The company decided that the time had come for reviewing its transformer-secondary practices.

The problem of determining the most economical combination of secondary size and type and transformer spacing is a complex one. Among factors to be considered are customer demands, load growth, density, diversity, regulation, losses, service reliability, customer good will, maintenance, flexibility, and economics.

To keep the study as general as possible many factors were retained as variable, so that 84 individual physical systems were considered. They included seven wire sizes, from No. 2 to 336,400-circ-mil ACSR, and three conductor configurations. The latter were:

1. Open wire on crossarms with a 3-wire bus on each pole and weather-proof ACSR conductor, the company's present standard.

2. Open wire on rack with ACSR conductor and with the climbing space clear for safety.

3. Cabled secondary consisting of two all-aluminum insulated conductors spun in the field to an aluminum and steel messenger with "mid-span" type loop connections placed so that they can be worked from the pole.

Four span lengths studied were 100, 120, 150, and 200 ft. Equal loading for each pole was assumed, although not necessarily equal loading in secondary sections. Load was divided on the secondary according to the diversity factor for the number of customers served by that section of secondary.

Electrical and economic characteristics of the 84 systems were calculated for 75 combinations of initial demand, rate of growth, and

Cabled Secondary for Savings

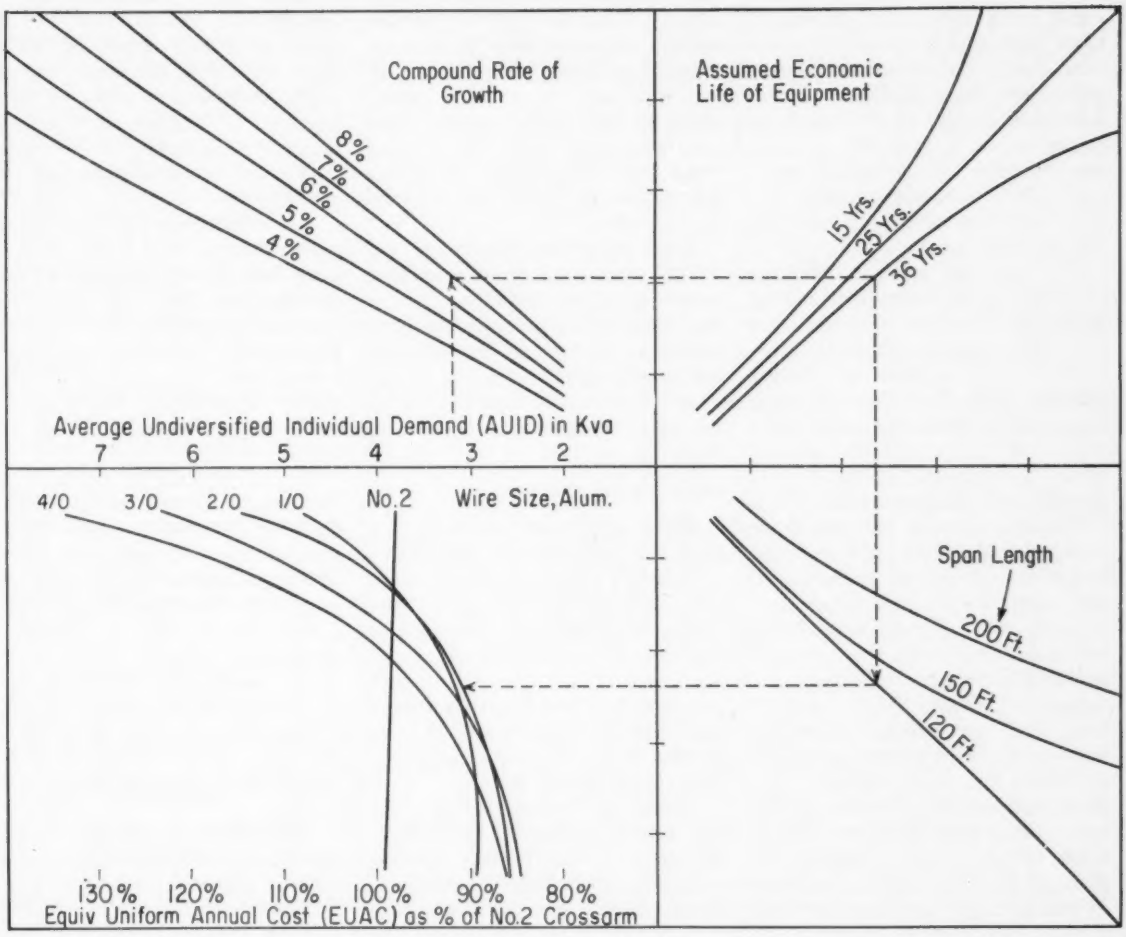


FIG 1—NOMOGRAPH can be used for calculating economics of cable secondary for any initial AUID. Line is then followed upward to desired compound rate of growth curve, then horizontally to assumed equipment life, downward to the span length curve, and horizontally again left to the first wire size curve intercepted. This gives most economical secondary size for conditions chosen. Scale below wire size relates percentage costs

equipment life. Individual customer demands used were 3, 4, 6, 8, and 10 kva. The rates of load growth were 4, 5, 6, 7 and 8%. The life of equipment was taken at 15, 25, or 36 years, with a fixed charge rate of 15.4, 13.0 and 12.1%, respectively.

The study was made on an IBM 607 computer, which is considered limited in capacity for solving involved engineering problems. But it was the only computer available. By careful setting up of the formulas and studying the programing the 607 did do the job. A larger computer would have saved time. Actually, the computer was the only practical method of studying the 6,300 individual problems with their more than 3.8 million calculations.

Transformer loading was limited to 150% of the nameplate rating. Transformers might be loaded to less than this maximum when the secondary system is limited by voltage drop, but no calculations were based on transformer loadings of less than 100% before the system becomes limited by voltage drop.

It is normally desirable to use a single size of secondary conductor throughout residential areas as it is not practical to design various sizes of secondaries for different block loadings.

As the transformer-and-secondary combination was considered as a unit, it was necessary to determine when transformer capacity should be increased. This operating limit is controlled either by maximum allowable voltage drop, or transformer loading.

Maximum allowable voltage drop was set at 6% for the combination. This figure was reached by taking the 10% permissible voltage drop in the distribution system and allocating 3% to the primaries, 1% to the loop, and 6% to the transformer-secondary section of the system.

The first step in preparing the problem for the IBM computations was to determine prices and elec-

trical constants of the system. Prices for conductor and other materials were taken at the same time. Labor costs were estimated according to company practice. Prevailing labor rates and overhead expenses were used, and impedance values were taken from catalogs. The information was put on IBM cards by coding the cards with the variables and partially coding the information. The computer matched the codes and assembled the information on each card.

The next step was determination of maximum Average Undiversified Individual Demand (AUID) that each transformer-secondary combination was capable of serving without exceeding the operating limits set up. Economic calculations were made for each of 75 combinations of initial AUID, rate of load growth, and equipment life.

Annual cost was calculated for each physical system for the specific conditions set and for each year of the equipment life used in that case. Present worth of each annual cost was determined, and these present worths were totaled for each specific system and case. The computer took the summation of present worth and, with a proper multiplier, calculated the equal payment over the period considered for the specific case. Equivalent Uniform Annual Costs (EUAC) were compared for plans of the same initial conditions in order to arrive at the economic wire size and the configuration.

Computer calculations gave 6,300 answers, which were then developed into nomographs. Each nomograph allows for five variables: Initial demand, compound rate of growth, assumed economic life, span length, and wire size. There is a nomograph for each configuration; crossarm, rack, and cable. Many variables were retained in the nomographs. In this way they can be easily studied.

Final wire size curves and the EUAC scale were determined as a percentage of the cost of No. 2 conductors on crossarms under the same conditions of demand, growth, life, and span length. The graphs (Fig 1, 2, and 3) can be compared only at the same horizontal level on all three nomographs.

Some Values Omitted

Three initial values were omitted from the nomographs. The No. 1 and the 336,400-circ-mil wire sizes were not economical within the ranges of initial load and rate of load growth considered. Also, the No. 1 size is too near the present standard No. 2 to be given serious consideration. The 100-ft span was omitted from the nomographs, as the average span is longer.

Results of the economic study have been applied to the Public Service system. To do this, specific values of span length, initial demand, rate of growth, and equipment life had to be determined.

An average span in the areas of newer construction in the Denver division was determined to be slightly over 120 ft. This was the figure used. To determine AUID three areas were surveyed. The installed transformer capacity there averaged 1.1 kva per customer, and customers averaged 13.1 per transformer. Average transformer size was 14.7 kva.

It was estimated that the average transformer is overloaded 25% at peak load. Combining the 1.1-kva installed capacity and the 25% overload, the average diversified demand at the transformer was at 1.4 kva per customer. Applying the diversity factor from Fig 4 to the 1.4 kva gave a value of 3.2 kva for the AUID.

No information is available on the compound rate of growth of domestic customer demands. Therefore, the demand figure was calculated from records of the yearly rate of growth of customer energy usage. This was nearly 7%. As a result of these calculations, 3.2 kva per customer was used for demand and 7% for the demand rate of growth.

Equipment life was estimated at 36 years, based on the allowable straight-line depreciation rate of 2.75%.

Using these values the calculations showed that the most economical wire size and configuration was No. 2/0 aluminum cable secondary.

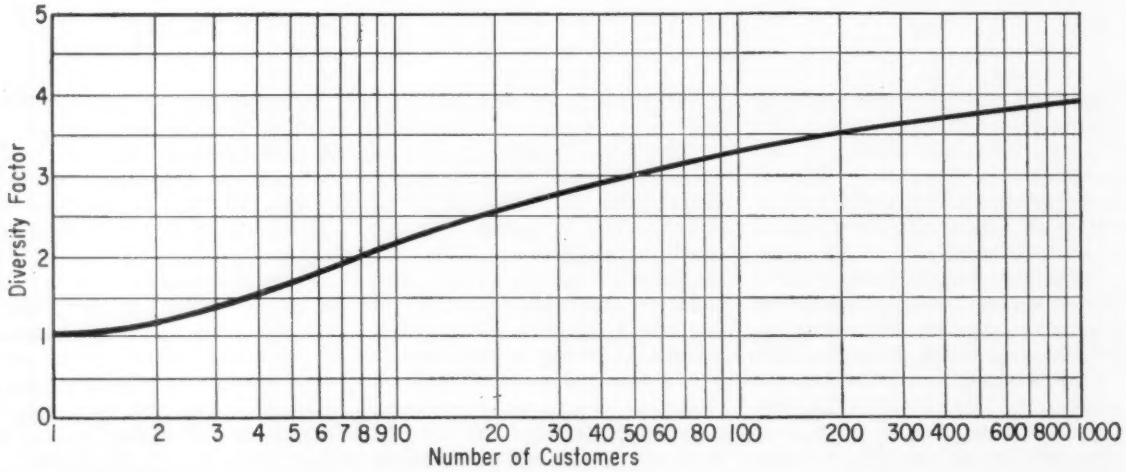


FIG 4—DIVERSITY FACTOR, determined from curve, was applied to installed transformer kva per customer for determining Average Undiversified Individual Demand (AUID). As Fig 1 shows, No. 2/0 aluminum cabled secondary led

It costs 91% of the cost of No. 2 ACSR crossarm-type secondary. The most economical rack type of secondary is No. 2/0 ACSR which costs 91.8% of the cost of No. 2 ACSR secondary on crossarms. The most economical crossarm-type of secondary is No. 2/0 ACSR which costs 92.3% of the cost of No. 2 ACSR crossarm-type secondary.

No. 2/0 aluminum cable secondary proved to be the most economical not only for 3.2-kva initial demand and 7% rate of growth. It is most economical for a range of combinations of initial demands and rates of growth. These included: An initial demand of 3 kva with rates of growth of 6, 7, or 8%; an initial demand of 3.5 kva with 4, 5, 6 or 7% rate of growth; and, an initial demand of 4 kva with rates of growth of 4, 5 or 6%.

There are many other advantages of cable type secondary over both open types of secondaries. One is the reduction of inductance in the secondary system. A certain amount of capacitance is inherent in the cable type construction. This increased capacitance has some dollar value in secondary capacitors which was not included in the cost figures in the study.

Transformer Changeout Schedule

120-Foot Span Length, 36-Year Life and 3-Kva Initial Demand
Transformer Sizes in Kva

	6% Rate of Growth				7% Rate of Growth			
Year	No. 2 ACSR Cross Arm	2/0 ACSR Cross Arm	2/0 ACSR Rack	2/0 Alum. Cable	No. 2 ACSR Cross Arm	2/0 ACSR Cross Arm	2/0 ACSR Rack	2/0 Alum. Cable
0	1-25	1-25	1-25	1-25	1-25	1-25	1-25	1-25
1								
2								
3								
4								
5								
6								
7								
8					1-37½	1-37½	1-37½	1-37½
9	1-37½	1-37½	1-37½	1-37½				
10					2-25			
11								
12	2-25							
13								
14						1-50	1-50	1-50
15								
16		1-50	1-50	1-50	2-37½			
17								
18	2-37½					1-75	1-75	1-75
19								
20								
21		1-75	1-75	1-75		2-37½	1-100	1-100
22					2-50	2-50	2-50	2-50
23								
24		2-37½	1-100	1-100	2-75			
25	2-50	2-50						
26			2-50	2-50	5-37½	2-75	2-75	2-75
27								
28	2-75							
29								
30	5-37½	2-75	2-75	2-75	5-50			
31								
32						2-100	2-100	2-100
33								
34								
35	5-50				5-75	5-75	5-75	5-75
36								

Cable's Advantages Cited

Cable secondary is safer and neater in appearance than the open-wire types. The pole top with ridge pin primary and cabled secondary is easier to work. Customer good will should be increased by its neater appearance, and some pressure for underground residential distribution should be relieved. Maintenance costs should be less and service continuity better.

Cable type secondary eliminates secondary crossarms which are becoming difficult to obtain. It is easier to install through trees, and less tree trimming is required thereafter. Cable type secondary conserves pole height by eliminating the crossarm bus.

The strong steel and aluminum messenger for the cable secondary virtually eliminates broken secondary conductors due to falling branches. The stainless steel spinning wire should minimize abrasion troubles on the secondary. While cable costs were based on field-spun cable, prespun and triplex cable should not be over-looked.

The labor for insulating and taping tap connections on cable secondary has been reduced in three new cable taps now available. These make it possible to tap the cable with four loops, either in mid-span or within reach of the pole, without taping.

Today's homes have many types of motors, some with automatic controls. Such loads present flicker problems which can be reduced by the larger conductor sizes and cabled secondary. A block of No. 2/0 aluminum cabled secondary with one 25-kva transformer, banked with a similar section, has 50% less flicker than a section of No. 2 ACSR crossarm type secondary with two 15-kva transformers, banked also with a similar section. The reactance of the system is substantially decreased by using one large rather than two smaller transformers, plus the larger wire size and cabled secondary.

The economics of this study dealt with new construction. The question, when to change out No. 2 ACSR (or equivalent) secondaries for the new standard No. 2/0 aluminum cable, is another problem. The No. 2 secondary system could be made to carry the load indefinitely by changing transformer spacing. But there comes a time when such handling of load growth is no longer economical. Determination of this point involves recognition of the sacrifice value of the existing small secondaries and a number of other considerations requiring another complete economic study.

Changeouts in Table

Although secondary changeouts were not considered in the economic study, it was necessary to calculate the size and number of transformers for the variations of initial demands and rates of load growth. Transformer sizes considered were limited to standard ratings. Changeouts for different conditions are shown.

Towers on River Side of Levees

Mississippi-crossing suspension towers and spans for 230-kv transmission are shorter; line now operates at 138 kv

Placing suspension towers for a new 230-kv transmission line crossing the Mississippi on the river side of the levees enabled engineers to achieve material-cost savings. These were obtained through reducing the height of the towers and the length of the span. The economies were engineered on the new double-circuit line recently placed in service by Gulf States Utilities Co near Baton Rouge, La.

This tower placement was selected by N. C. Spencer, superintendent of Electrical and Civil Engineering, and associates of Gulf States Utilities of Beaumont, Texas. Stone & Webster Engineering Corp designed and supervised construction of the transmission-line crossing, which is at a point where the river channel is in the center of the river bed.

SUSPENSION TOWER is outside the levee at Mississippi River crossing, an economical arrangement feasible at this point because bank erosion is not a problem. The crossing is where the river channel is in center of river bed

At this point, there has been no bank erosion in the past 50 years, a circumstance that led engineers to believe that no erosion will take place in the future. Nevertheless, the foundations were so designed that their stability would not be impaired by flood conditions or ordinary bank erosion.

The towers outside the levees with high concrete foundations on piles and extending above the high-water level permitted a span of 3,930 ft between towers. This contrasts with a span longer than 5,100 ft, which would have been required were the towers on the land side of the levees.

Tower Height Reduced

The required tower height was reduced from more than 650 ft to the 421 ft as installed, resulting in another cost savings.

A third feature of this crossing is the use of concrete anchors at ground level instead of anchor towers at each end. Anchor sites are protected by fencing.

The crossing, designed and insulated for 230 kv, is operated initially at 138 kv on one circuit, the other circuit being reserved for a second 138-kv line crossing in the near future.

Pole Structures Special

Gulf States Utilities engineering personnel did the long-range planning, selected the river-crossing conductors, planned the details, surveyed and obtained rights-of-way on each side of the river, and secured the approval of various public bodies involved. Stone & Webster engineers designed the towers and anchor foundations, drew up the specifications for the crossing, and supervised its construction.

The transmission line, connecting to either end of the river crossing, is of wood-pole, 'H' frame construction. Near the ground anchors special wood-pole structures connect the transmission circuits to the river-crossing conductors, each of

Yield Savings in Material Costs

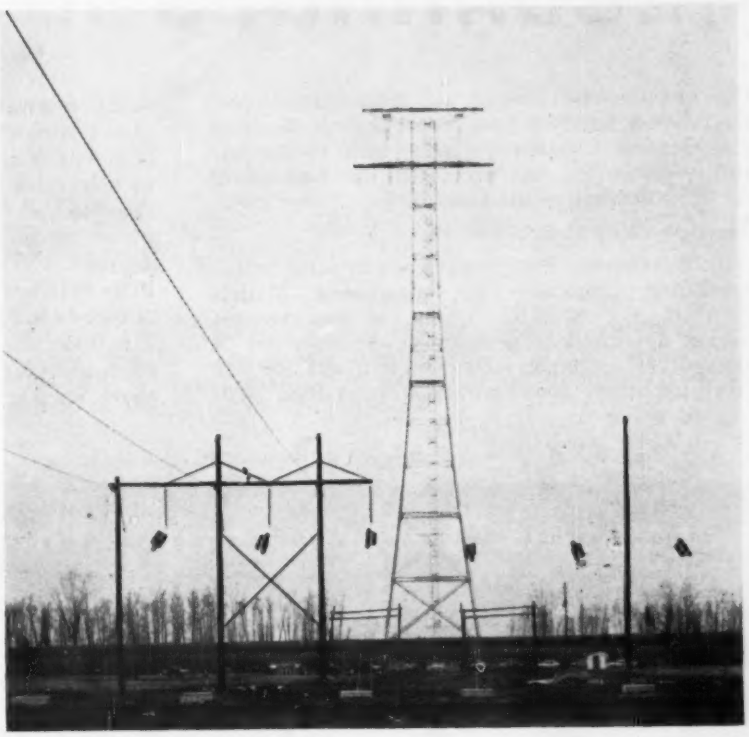
which is deadended with a triple string of 25,000-lb insulators underneath the wood-pole structures. A steel cable from the triple string of insulators is continued to the ground-level anchor, which is two piles with a concrete cap.

Double strings of 25,000-lb insulators support the conductors at the suspension towers. The conductors, however, are deadended at the bottom of the insulator strings instead of being carried through in suspension clamps. This arrangement, it is believed, materially reduces the possibility of fatigue troubles with the conductor.

Sag Can Be Adjusted

Both conductor and static wire have Stockbridge dampers. Compression-type dead-end fittings for the 3,930-ft river spans of the conductor were attached to calculated lengths in the conductor manufacturer's factory. Turnbuckles in all spans permit the making of final sag adjustments.

A flashing beacon at each tower top and obstruction lights at the one-third points of the towers warn aircraft.



SPECIAL WOOD-POLE STRUCTURE near the anchors connects the transmission circuits to the river-crossing conductors, each deadended with a triple string of 25,000-lb insulators underneath the wood pole structures

Design Features of the River Crossing

Conductors

Number—6
Size—807 MCM, 46/61 strand ACSR, aluminized core
Weight per Ft—1.892 lb
Diameter—1.28 in.
Ultimate Strength—72,400 lb
Final Unloaded 60F Tension—17,800 lb
Tension, NESC Light Loading, 20,560 lb
Tension with 25-lb per Sq Ft Wind, 60F—28,520 lb

Static Wires

Number—2
Size—7-strand aluminized steel
Weight per Ft—0.346 lb
Diameter—0.4086 in.
Ultimate Strength—17,400 lb
Final Unloaded 60F Tension—3,500 lb
Tension, NESC Light Loading—4,960 lb
Tension with 25-lb per Sq Ft Wind, 60F—7,830 lb

Insulators

Suspension Towers—2 strings of 20, 5¾-in. x 10-in., 25,000 lb insulators per conductor
Anchor Dead Ends—3 strings of 18 5¾-in. x 10-in., 25,000 lb insulators per conductor

MORE POWER TO AMERICA

...continues to promote

The two General Electric advertisements reproduced below, nearly 40 years apart in time, illustrate how General Electric, together with its electric utility customers, has promoted the benefits of electrification across the years.

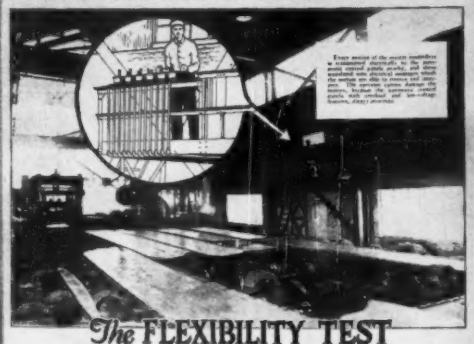
Electricity: Key to Productivity

In 1945 General Electric gave new impetus to this continuing promotion by introducing MORE POWER TO AMERICA, one of the broadest market development programs ever conceived. A cooperative endeavor, this Program enlisted the efforts of utility power salesmen, consulting engineers, contractors, machinery salesmen, and G-E sales engineers. Armed with an extensive library of communication tools, these individuals set out to help raise industrial productivity through the increased electrification of a post-war America whose industry was less than 50% electrified. An increase in kilowatt-hours per manhour from 4.7 to 10 by 1955 was the ambitious goal. The actual figure attained was 9.7 kwh, only .3 kwh short of the target.

In 1955 a new goal—even more optimistic—was established for the next decade. As indicated on the chart, kilowatt-hours per manhour can rise to 20

Increased Electrification Through Continual

This advertisement appears in the Electrical World this month



The FLEXIBILITY TEST

Six sturdy G-E Motors and a modern system of G-E Automatic Control are at the command of the operator of the marking tables in this steel mill. Each motor is reversible and is provided with an electric solenoid brake which acts quickly whenever he shuts off the power.

Standing on the platform above his work, this operator can watch every operation. He can move a thirty-foot plate a fraction of an inch, or speed it along to the shears at the rate of 15 miles per hour. At any time he can stop everything instantly with the move of a hand.

These operations are performed constantly, day in and day out. The flexibility and reliability of this equipment are typical of the results obtained with G-E Automatic Control.

Ask our nearest office.

General Electric Company

General Offices: Schenectady, N. Y. Sales offices in all large cities

Ad. Reprint 320

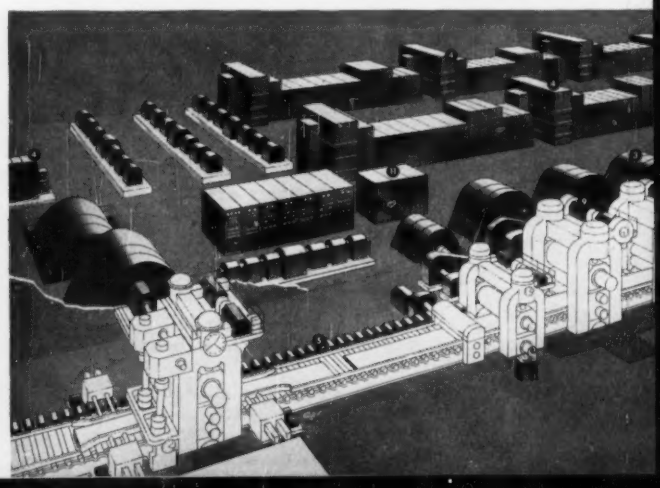
1920
1.3 Kwh/manhour

MORE POWER TO AMERICA

1959
12.9 Kwh/manhour

General Electric's new program for Automation through Modernization will help you . . .

REDUCE SCRAP LOSSES, MODERNIZE FOR PROFITS



increased electrification

by 1965, if the electrical industry continues in the conviction that there is nothing automatic about progress and works hard to develop old and new markets for electric power.

General Electric continues to offer a variety of MORE POWER TO AMERICA selling tools to all those who want to help the electrical industry meet its 1965 objective:

Film Programs

Each program consists of a non-commercial motion picture or slide film with a manual and supplementary literature. Twenty of these programs are currently available on a loan or purchase basis. As an example of the extensive audience reached by these programs, an estimated 46 million people have seen "Farm Family American" directly and on television. Additional programs, several in the field of industrial automation, are planned for production in 1960.

Educational Exhibits

These exhibits are available for meetings and conventions to show the uses of various products. They may be presented in conjunction with certain of the film programs.

Productivity Forums

Over 20,000 industrial managers, realizing higher productivity is vital as competition increases, have attended the 120 meetings conducted thus far by major electric utilities. In addition, General Electric has made nearly 200 industrial electrification presentations to individual industrial users.

"Load" Magazine

Eighty issues of this magazine, which features practical ideas to help electrify industry, have been published during the past 15 years. Approximately 10,500 copies of each issue are mailed to power sales engineers and people in related fields.

Conferences of Utility Executives

Conducted on national, regional, and district levels, these gatherings provide an opportunity for the interchange of ideas among the leaders of the electrical industry.

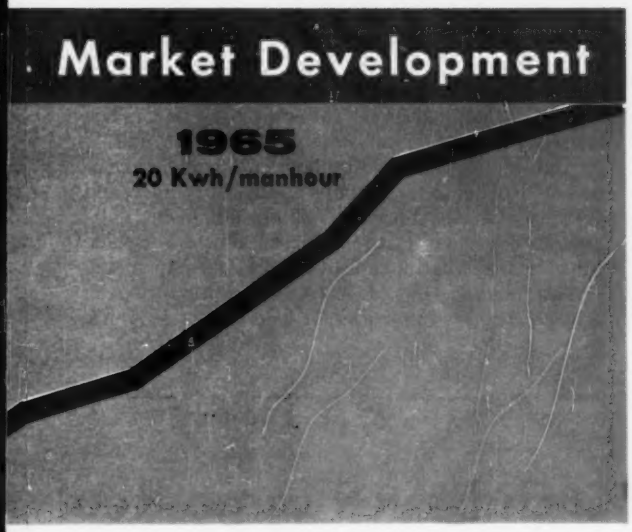
Advertising and Publicity

Space advertising, direct mail, promotional bulletins, publicity, and magazine articles help keep the nation informed about the benefits of electrification.

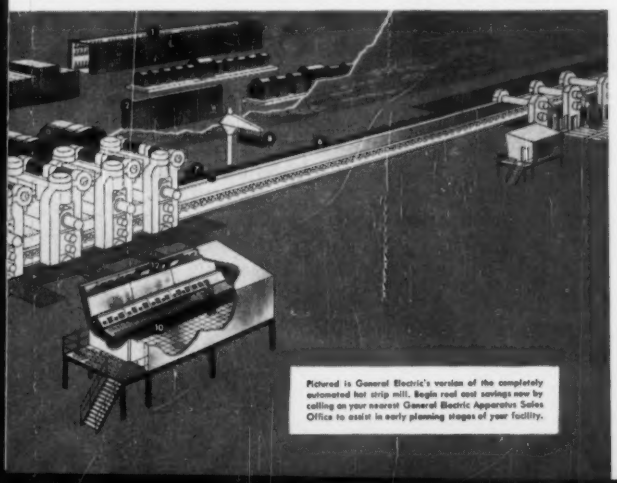
Today, 15 years after the birth of MORE POWER TO AMERICA, the electrical industry can feel proud of the Program's accomplishments. But much remains to be done. If the 1965 goals are to be realized, the abilities of the entire industry will have to be exerted as never before. Effective selling tools are available, and more are on the way. Contact your G-E Apparatus Sales Office or write to Section 350-1, General Electric Company, Schenectady 5, New York.

MORE POWER TO AMERICA

GENERAL ELECTRIC



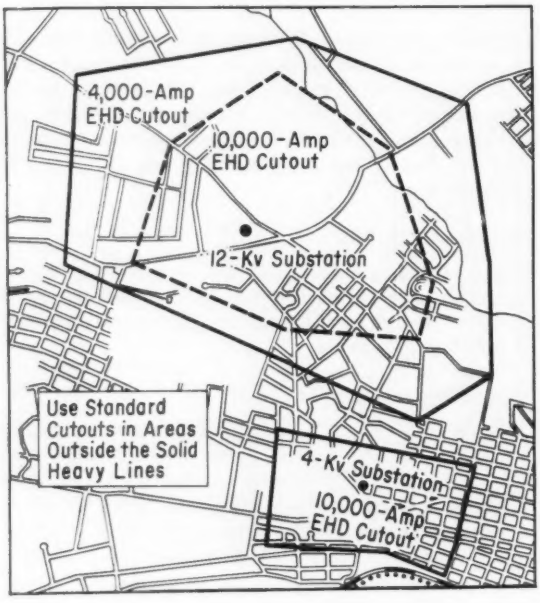
One of the many benefits of automating your hot strip mill will be a significant reduction in scrap losses. Major advances in regulation of stand speeds minimize looping and stretching. Automatic gage control can reduce strip cobbles by as much as 27%, decrease lost rolling time due to cobbles 35%. Step-by-step implementation of General Electric's "Ring of the Future" will provide you with these and many other benefits of automation through a profitable plan of modernization. For full details on Automation through Modernization, mail the coupon below, today.


Pictured is General Electric's version of the completely automated hot strip mill. Begin real cost savings now by calling on your nearest General Electric Apparatus Sales Office to assist in early planning stages of your facility.

Install Heavy-Duty Cutouts on

W. W. KREBS, District Superintendent, and

B. T. STONE, District Engineer, Appalachian Power Co, Roanoke, Va.



AREA BOUNDARIES are set up for use by engineering and field personnel in the installation of new heavy-duty cutouts and the routine replacement of existing standard-duty cutouts on 4-kv and 12-kv systems

Inadequate and obsolete cutouts near high-capacity substations are replaced with heavy-duty cutouts gradually and economically under a procedure developed by Appalachian Power Co. The procedure avoids unnecessary service outages, damage to plant from failure of inadequate cutouts, or possible failures of misapplied standard duty cutouts. Replacements are engineered into office-prepared orders in a routine fashion. The procedure also assures that the proper cutout will be used as a replacement during emergency conditions.

Map and Instructions Prepared

The first step in setting up the procedure was an engineering study of short-circuit currents on circuits leading from all substations where capacity (station, system or line) had grown in the past few years. The result was an area application map for 12-kv and 4-kv substations, as shown in the accompanying example, and detailed instructions for use by office and field personnel. The original map for all affected substations is posted in the engineering office. The same information is carried on the operating map in the service foreman's office. Detailed descriptions of each area are kept by line crews for field use.

Truck Winch Drives Large Reel

DALE R. OSWALD, Garage Mechanic, Indiana & Michigan Electric Co, South Bend, Indiana

OLD CONDUCTOR is rewound tightly on large reel. Up to 3,000 lb of conductor may be reeled at one location

Overhead conductors may be wound directly onto a full-sized reel driven by a line truck winch through a simple cable-winding attachment developed at Indiana & Michigan Electric Co. Use of the attachment in the South Bend district has allowed the salvage of more than 500,000 lb of conductor in lengths weighing up to 3,000 lb during the past 26 months.

The simple attachment was designed to overcome the problem of removing old transmission or distribution conductors by reeling them manually on spare reels or on the small take-up reel on a line truck. Either method required that the small coils be unwound, spliced and rewound on larger reels. This also meant moving the line truck frequently.

The new shaft provides a powerful drive to tightly coil up to 3,000 lb of cable on one full-size reel

Planned Basis

Based on engineering and procedural studies, these engineering department recommendations were issued for cutout replacement on single-phase lines.

Instructions for 4-kv Areas

1. Extra-heavy-duty open-type cutouts of 10,000-amp interrupting capacity ordinarily should be used in areas within the solid line on the map.

2. Standard-duty enclosed-type cutouts should be used in areas outside the solid line.

3. On congested poles, a 100-amp, enclosed-type cutout with a 10,000-amp interrupting rating should be used.

Instructions for 12-kv Areas

1. In the area immediately adjacent to certain stations, 100-amp, 7.8-kv, open-type cutouts with a 10,000-amp interrupting capacity ordinarily will be used on new transformer installations and for sectionalizing single-phase branch lines. These areas are enclosed by a dashed line on the application map.

2. Just outside the dashed-line area, where available short-circuit current is less than 4,000 amp but more than 3,000 amp, 100-amp, 7.8-kv, open-type cutouts with a 4,000-amp interrupting rating are indicated. However, a 5,000-amp cutout actually is used in the area between the dashed and solid lines.

3. Standard-duty cutouts will be used in all areas beyond the solid line.

4. On congested poles where use of open-type cutouts may be hazardous, a 50-amp, 7.8-kv, enclosed-type unit with a 4,000-amp interrupting rating should be used. Where load currents require a 100-amp unit, a cutout with an 8,000-amp interrupting capacity should be used.

During emergency work at both voltages, where a cutout is replaced on a line transformer or single-phase branch line, only the 100-amp, 7.8-kv open-type cutout with a 10,000-amp interrupting rating should be used within the heavy-duty cutout areas. A standard-duty cutout is used in all other areas.

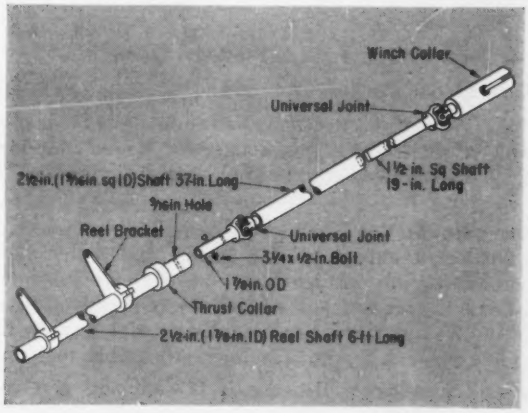
To take advantage of preplanned work for change-over to heavier-duty cutouts, this procedure is used: On all new transformer installations or replacements within the high fault-current areas described, the proper-rated cutout is installed initially or to replace the standard cutout. New single-phase line sectionalizing cutouts installed or existing cutouts replaced within the high fault-current areas should be of the proper rating. The type of cutout to be used should be stated on the job or work order and also on the storeroom charge record.

on Trailer Through Special Shaft

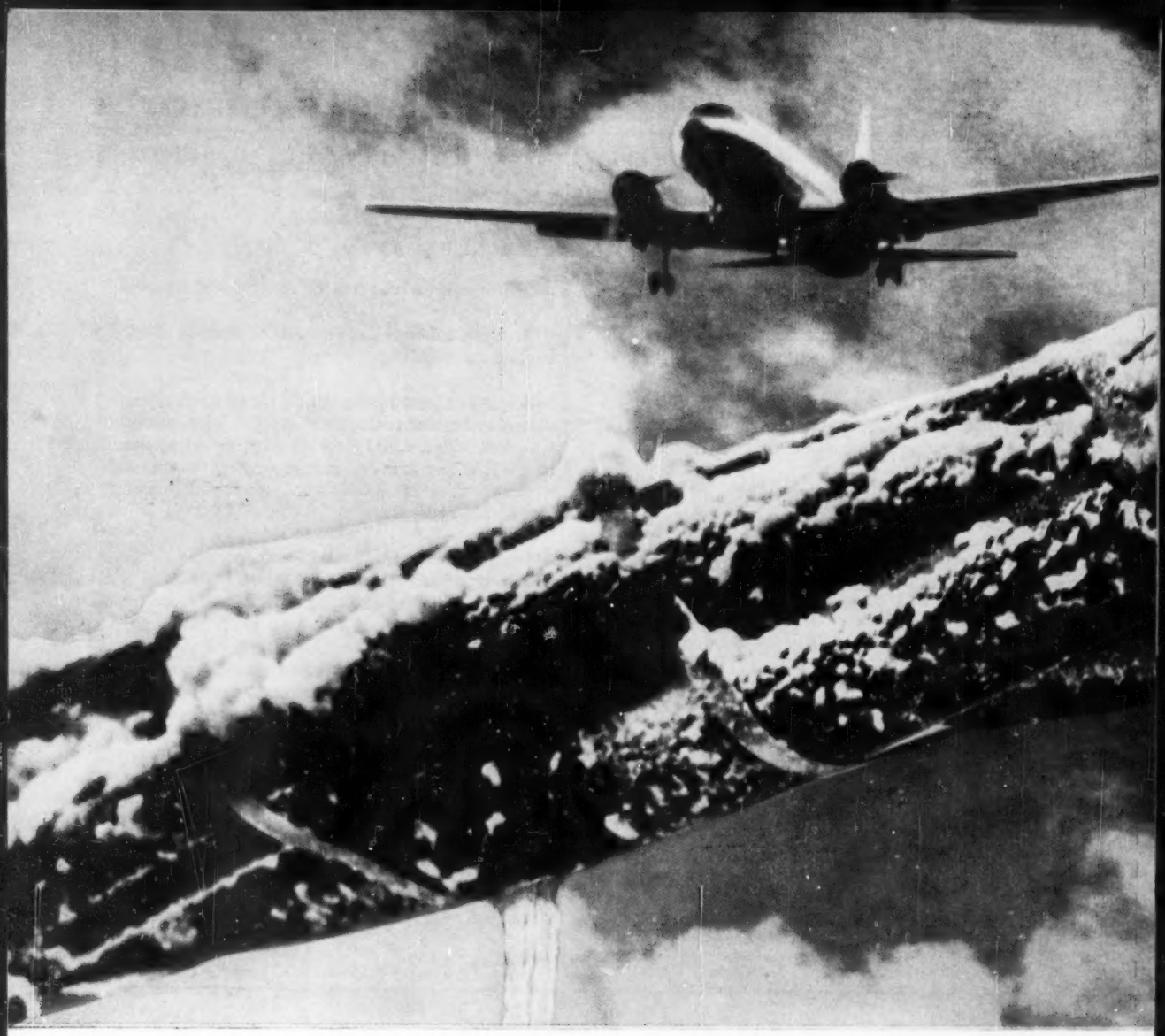
mounted on a reel trailer from one location. The shaft consists of three sections:

- A 2½-in. shaft equipped with adjustable clamps to support the cable reel. A thrust collar keeps the reel in place during winding.
- A tubular automotive drive shaft fitted with a universal joint and a bolt to connect to the reel shaft. A square collar welded into the other end of this shaft serves as a driving spline.
- A slotted collar welded over the other universal joint to fit onto the end of the truck-winch drive shaft. A piece of 1½-in. square steel shaft completes the assembly. It telescopes into the tubular drive shaft and serves as a length adjustment.

Most of the parts for this shaft were salvaged from discarded automotive equipment. Total cost, including $45 for welding and lathe work, was only $67. The device was tested to make sure it would safely take the heavy torques encountered during winding.



SPECIAL SHAFT provides a powerful connection between the truck winch and a full-size reel on a trailer



Pile on the ice and snow!

Let it sleet. Let it snow. Let the wind blow.

This cable can weather the storm.

Rome's reverse-lay preassembled aerial power cable has a built-in, high-strength messenger for staunch support. Falling branches—even some trees—can be supported by the cable itself!

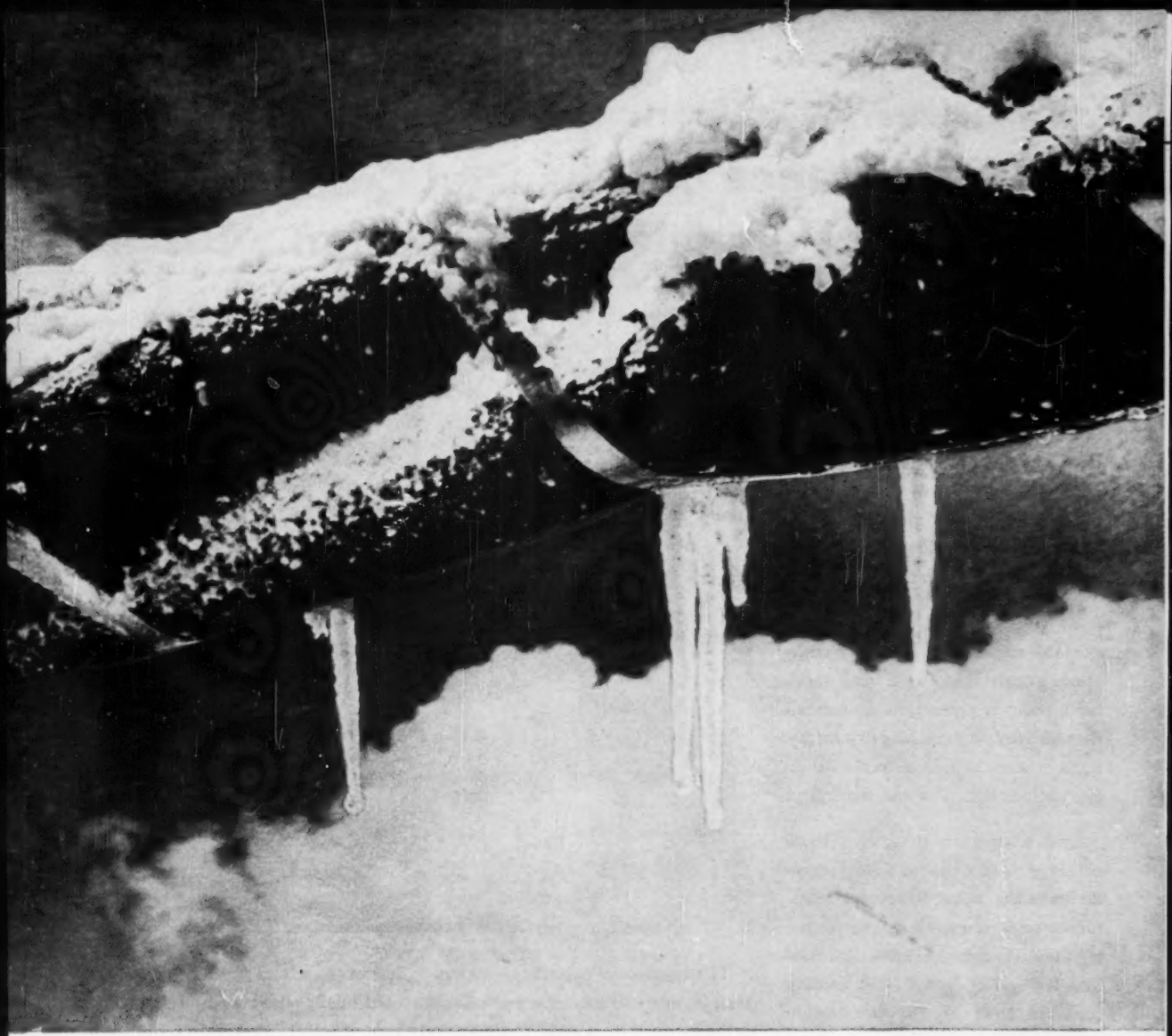
Fewer outages You can use this aerial cable to reduce the chance of outages during storms and high winds. Because it is fully insulated and jacketed for maximum resistance to moisture and tree abrasion, it prevents wet branches from shorting between phases. And it's *safer* for your line crews to handle . . . safer for the public too!

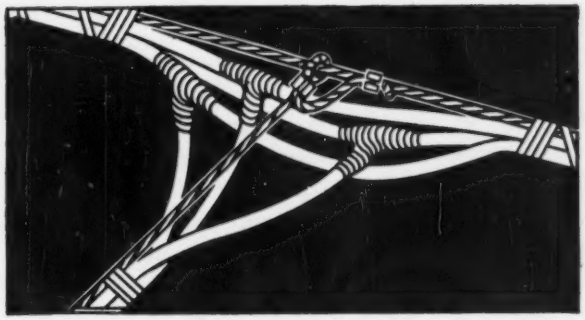
Routing more direct Because it is compact, you can route preassembled aerial cable more directly, with less right of way than is required for open-wire systems. You can run more circuits in less space. Less clearance is required, so you do less tree trimming—initially and periodically!

Wide range of constructions You can get Rome's preassembled aerial power cable in a wide range of constructions, rated up to 15 KV: Rozone (oil-base), Polyethylene, or Rozone A (butyl-base) insulation, Roprene (polychloroprene) or Roseal* (flame-retardant polyethylene) jacketing.

Get all the details from your Rome Cable salesman, or clip and mail the coupon today!

*Trade mark—Patented.





EASE OF TAPPING Long spans sometimes make mid-span tapping necessary. Rome's reverse-lay preassembled aerial cable construction—where the direction of lay of conductors is reversed at regular intervals along the line—permits easy mid-span tapping. The reversed portions provide sufficient slack for taps *anywhere* along the line! This eliminates the necessity of making taps at the pole ends only. Stress is carried entirely by the messenger. Conductors can be untwisted for tapping without cutting—even while the line is hot if conductors are unshielded (5 KV). Your linemen can use wire guards and rubber blankets for safety and make pole-end taps without use of a platform.

BETTER VOLTAGE REGULATION Because of its close geometric spacing as compared with open-wire circuits, aerial cable has a lower reactance. Voltage drop is about half as great as typical crossarm construction and, for a given voltage drop, power can be transmitted twice as far.

ROME CABLE
DIVISION OF **ALCOA**
Department 110, Rome, New York

☐ Please send me more information on the above.

Name .....

Title .....

Company .....

Street .....

City ..... Zone ..... State .....

MEET THE MAN

WHO'S DEDICATED TO **YOUR** JOB

YOUR ROME CABLE SALESMAN

The Importance of Balanced Compounding in Portable Cable Design

A portable cable is constantly under attack from many different directions. It is dragged over rough floor surfaces and rocky terrain, crushed under the wheels of trucks and carts, continually bent, flexed and stretched. In addition, it is very often subjected to attack by water, solvents, oil and ozone.

To give long, dependable service, portable cables must be able to withstand rough treatment, and must have built-in protection against all deteriorating factors. Moreover, they must possess other desirable qualities such as lightness and flexibility.

The science in designing these cables is to add the necessary ingredients in the jacket to provide maximum protection along with the maximum of other desirable features. This is where *Balanced Compounding* comes in. It is very easy to provide protection against one or two of the deteriorating factors, simply by loading the compound with an ingredient which is impervious or highly resistant to these factors. Unfortunately, however, the ingredients which provide resistance to abrasion or crushing may be highly susceptible to attack by oil or water; and vice versa.

The cable designer's problem, then, is to attain a balance in his compounding formula which will provide maximum protection against one deteriorating factor without reducing protection against others below the danger point.

To the buyer of cables, this means that *quantity* of any one ingredient is unimportant, unless it is considered in relation to the over-all ability of the cable jacket to resist *all* of the abuses to which it is subjected.

For balanced resistance to all these abuses, the best assurance you can get lies in the quality of the research and development facilities of the manufacturer, and the product's record of performance.

This is one reason why — in those industries where portable cables are continually used or purchased as components of a manufactured product — Simplex Tirex Cables are regarded as the standard.

Proof of the worth of Tirex *Balanced Compounding*, which gives balanced resistance to all the deteriorating factors of normal use, can be found in the fact that Tirex cables have been successfully performing under the most rugged operating conditions for periods ranging up to twenty years.

BALANCED COMPOUNDING CURED IN LEAD

Simplex

WIRE & CABLE COMPANY

Cambridge, Massachusetts and Newington, New Hampshire

How to Train a Supervisor

Report on
Supervisor Training

Are your new supervisors ready for their jobs—or not? Probably they aren't, says Howard E. Hebble, Director of Educational Work at Public Service Electric & Gas Co. Simply because there is a gap between any man's potential ability to do a job and his actual performance on the job. It is a gap that is widest and most serious at the time the man is promoted. It is a gap you can fill, at least partly, with training.

Utilities have a whole spectrum of training techniques to choose from. They range from loosely informal on-the-job training to strictly formal book-and pencil classroom sessions. Which is best? That depends on the company. Regardless, Hebble said, in a talk entitled "Supervisory Training—A Continuing Process," the objective is always the same: Improve the company by improving the man. And the outcome of that training, good or bad, will reflect on your company's profit and loss statement.

After all, what pulls in the profits in your business? It's not just your generators or distribution lines. It is also your people. Major policy may be conceived upstairs in the executive suite, but it has got to be made into results by the men down the line—by your supervisors and the men they manage. Consider this for a moment—a well trained supervisor can save your company money, improve your company's service and strengthen your employee and customer relations. An executive could ask for little more. The question is: how can you find a leader—a man for the supervisor job—and then train him to do it well?

What Is a Leader?

Not everyone wants to get ahead—to take on more responsibility. Some people are content to stay at a certain position and income level. But among the others, how do you single out the leaders? Unfortunately, there is no simple answer. Leadership is an abstract concept that defies exact description. Still, personnel men agree generally on the kind of qualities most leaders possess. Here is a broad view, according to *Personnel* magazine:

• **A leader is intelligent.** He's likely to be smarter than most of his subordinates, yet he is not so smart, so superior, that he can't talk and work with them on their own level.

• **A leader is well-rounded.** In his company he would rather bring his attention to bear on the broad problems of management than on a specialized field.

• **A leader is articulate.** He can speak well and write clearly and persuasively. He has an unusual facility with language.

• **A leader is emotionally and mentally mature,** not likely to "fly off the handle", or make rash, emotional decisions.

• **A leader has drive.** He wants to advance, to take on more responsibility and to learn more about his job, company and field.

• **A leader is a team man,** not a "lone wolfer". He knows how to get along with others and practices the so-called social skills.

• **A leader is much more likely to rely on his administrative ability** as he advances than on his previous specialized skills. The further along he goes, the less specialized he gets.

It takes time to pinpoint a man with leadership potential. But it takes a lot more time to develop him into a first-rate supervisor whose ability measures up to his company's needs. It can't be done overnight, or in a 40-hr indoctrination course, or in a two-month training course alone. The supervisor's job is simply too complex, too difficult, for that.

Some supervisory training is bound to go on in your company whether you have a training program or not. Your employees are always learning on the job. And how much they learn depends on your company's environment. A man is influenced by the things he sees and hears, by what others do, by company policies and the way they are followed, and by the unions.

Just the same, many companies don't want to rely on hit or miss supervisor development like that. They would rather have a plan to ensure successful management development. How should a utility train its supervisors, and when is the best time to start? Of the training techniques that have been devised, perhaps three stand out.

You can start years before promotion by setting up a management trainee program. This way you simply single out the most promising young prospects and train them before they become supervisors. Your men will have plenty of time to develop, they will be relaxed while the training is going on, and be on deck for a supervisory job when one comes along. It also gives your company a strong management pool for the future.

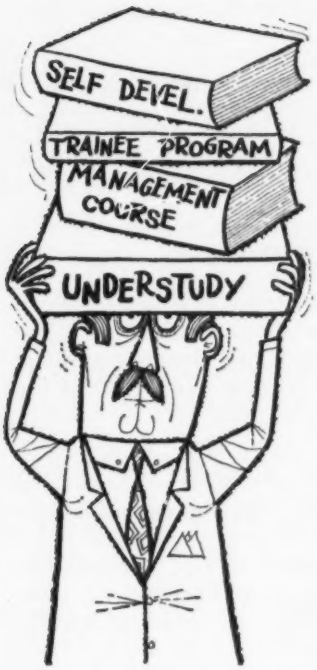
But the advantages of this method are sometimes outweighed by serious drawbacks. It can be costly to train a supervisor you may never need, or want. Supervisory demands are hard to forecast way ahead. Secondly, the qualities you have to look for in selecting the men are vague; the right choice is tough to make. And how about the man who is passed over by the program? What happens to his drive and initiative when he sees his company doesn't consider him managerial timber?

Another method is to make a man an understudy before he is promoted, when there will be a supervisor's position opening up. This may be an effective way to train, but then again, it may not. Essentially, it is a form of on-the-job training. And on-the-job training can degenerate into a rut of routine tasks that the regular supervisor wants to pass off on the newer man.

Or you can wait until a man is promoted and train him then. That way you can meet his training needs just at the time training is most important. He will

be anxious to learn fast and well, and everything he learns he can use.

But serious drawbacks bubble to the surface here too. A new supervisor may not be able to spare the time for training and cope with the pressing demands of a new job too. Do you think you can cram enough training into a few weeks to do a man much good? Perhaps, but what about the psychological problem of training the man at this time, when he is under extreme stress and anxiety about performing well in his new job?



Just the same, most electric utilities don't think these drawbacks are too serious. Chances are most supervisory training in electric companies is done at the time of promotion.

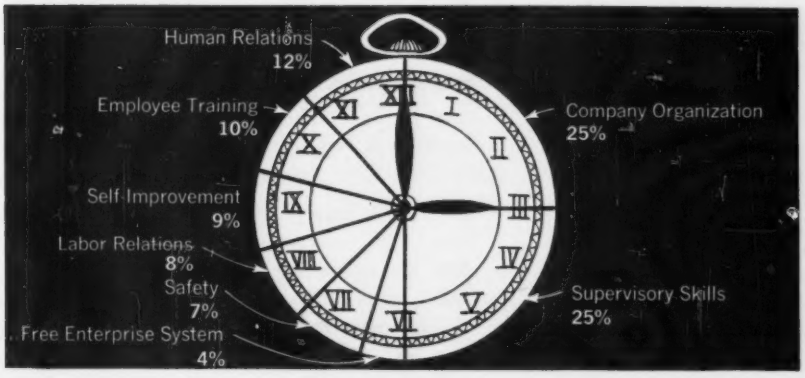
Should your training program be formal or informal? Just how far should you go in setting up elaborate training courses for future supervisors? To ponder this question too long is to miss the point—at least partly. A formal training program is no guarantee of success, nor is an informal one. An electric company could set up elaborate class schedules, write texts, create evaluation standards and publish reams of material—and still fail. It is easy to mistake an elaborate training system for results.

A company can't develop supervisors. Supervisors have to develop themselves. A company can offer encouragement and education, but the rest is up to the man. The climate management creates and the way the business is run are the controlling factors in management development. In other words, supervisors develop best in organizations that are already well managed. The success seems to be contagious.

But this in no way means that formal training programs are bad. On the contrary, a rigid training plan will concentrate management's attention on the training problem in a systematic way. And as soon as management takes notice of the training program and lends it's support, it has taken the first step toward developing "Grade-A" supervisors. A formal training program probably has a greater chance of succeeding than an informal program in the same company.

What's Covered in the Classroom?

What topics should a utility stress in its supervisory training program? If we take the formal class curricula of three eastern utilities Hebble mentioned as a guide, it looks like supervisory skills and company organization deserve the heaviest treatment. Such emphasis on specifics is not surprising, since each company he mentioned trained its supervisors after they were promoted. The breakdown of formal class work (as opposed to on-the-job training and observation) looks like this, on the average, for the three utilities.



Biggest section of class hours, fully half of all the courses, was devoted to supervisory skills (25%) and to company organization (25%). But both are catch-all categories that include many specialized subjects, such as "history of the company" and "techniques of handling paperwork."

The biggest single block of class hours devoted to an individual subject was angled at human relations, which took up about 12% of class time.

Employee training, screening and testing was next in importance, with about 10% of class hours devoted to it.

Self-improvement ran a close fifth on the list, with 9% of the class hours centered on techniques of public speaking, good writing etc.

Labor and union relations took up 8% of the programs, and safety another 7%. And to round out the 100%—the free enterprise system, accounting for 4%.

How the Program Works at Public Service

Here is how one of these utilities, Public Service Electric & Gas Co, runs its supervisory training program. The full-time program is spread over four weeks, and is intended especially for supervisors in the electric distribution department who have just been promoted. The program is divided into two parts.

Phase 1 takes place at the man's field location. It starts before he takes over as a boss, and lasts for two weeks. For three days he sits down with a qualified supervisor and spends a half day discussing each of six broad topics, such as the transition from worker to supervisor, safety, company and union agreements, etc. Then he puts in seven days of observation in other departments in his division, learning office procedure and seeing how supervisors at other levels work. That winds up the two weeks of phase 1. He now takes over his new job.

Phase 2 of the program is a conference group composed of new supervisors from all field divisions and different types of work. It lasts two weeks also, but doesn't follow right on the heels of phase 1. Public Service holds off until it can assemble enough men for a substantial group with varied backgrounds —usually once in three months.

These conference groups work on a lecture-discussion basis. The men spend more than half their time talking about practical problems and company case studies that involve the principles presented in the lectures. The men are free to say exactly what they think, and are urged to participate in the discussion to develop their ability to express themselves before a group. The program is kept as alive and varied as possible by frequently switching instructors, changing the subject matter and the meeting place.

The class breaks up for two hours at lunch time each day. The men eat together, then visit some general office department or see films. On the last day there is a graduation ceremony at a luncheon attended by the key executives of the department.

Has the Public Service program been successful? The utility thinks so, and the men do too. They have reported that the course has boosted their morale, made them feel truly a part of management, and given them more confidence in their ability to do their jobs.

Why has it been successful? Hebble, the company's training director, says this: First, top management has given the program its wholehearted support. Second, the material has been carefully made up and developed over five years. Third, the course is varied and practical; presented on a down-to-earth basis by men who work in field operations. Lastly, the atmosphere itself encourages supervisor development.

Georgia Power Adopts New Wiring Plan

- **Company purchase will include service entrance cable, or conduit and conductors, and service entrance box**
- **Utility contribution of $50-200 to installation contractor will help consumer pay for adequate service entrance capacity**
- **Wiring program to add $4.5 million to company's operating budget; EAR will be $1,378,000**
- **Plan will make it easier for homeowners to wire new homes or rewire existing ones**

Important Points in the Service Entrance Purchasing Plan:

- All installations of service entrance facilities must meet or exceed local and national electric code requirements
- Ownership of the service entrance facilities will remain with the company
- Facilities are to be installed for the utility by a contractor selected by the homeowner. Company will pay the contractor the amount agreed on and customer will pay any access.
- Double-pole (230-v) branch circuit positions must be reserved for exclusive use of 230-v appliances and must consist of breaker or fuse pull-out positions
- Qualifying appliances cannot be replacements for appliances now in use
- Electric water heater must be quick-recovery, 40-gal minimum, 4,500 w
- Electric heating must be at least 2.5-kw, permanently installed, and the exclusive means of heating.

Cash payments from $50 to 200 will help Georgia homeowners get adequate wiring in a revolutionary wiring assistance plan just inaugurated by Georgia Power Co. The company will contribute this amount to contractors who install adequate service entrance facilities. The plan, which has been approved by the Public Service Commission, will allow the utility to purchase and capitalize these facilities when certain conditions are met.

The utility hopes, by this plan, to make it easier for homeowners to wire their new homes or rewire existing ones with service entrance facilities capable of serving major appliances. To qualify for service entrance purchase, property owners or contractors must meet certain conditions designed to break the wiring bottleneck and to promote immediate and future use of electricity in new homes (see p 52).

This Georgia Power concept is exactly what Malcolm R. Rodger, vice president, Middle West Service Co, called for at the General Electric Co's kick-off meeting for its Residential Market Development Operation in Louisville, Ky., last week (EW, Dec. 21, 1959, p 33).

Under the Georgia Power plan, service entrance facilities include all the electric equipment up to and including the service entrance panel, but excluding circuit breakers, fuses and/or pull-out fuse holders.

Georgia Power will pay $50 for homes with 100-amp service entrances; $100 for 150 and 200 amp. An additional $20 bonus will be given if separately metered water heater is installed. Electric heating in 200-amp homes means a $180 cash award; $200 if electric heating and separately metered water heater are installed.

Most Practical Plan Chosen

Consensus was that a plan for purchase of service entrance facilities after installation offered the most practical solution and involved the least capital outlay for the company. This plan was adopted in preference to company purchase and distribution of required materials, company installation of required materials, and company supervision of electrical contractor bids and work. The company thought they might precipitate serious problems such as increase in company office and supervisory personnel, or increase in company stores area and inventory.

A Georgia Power survey revealed that wiring modifications to existing homes cost considerably more than the equivalent wiring in new homes. But the company could not justify paying a higher price for improving existing homes because the physical value of the facilities, after installation, would be the same as in new homes, and would be carried on plant accounts on that basis.

The builder of a new home must, through necessity, install certain electric facilities, the cost of which is pretty much determined. On the other hand, the existing property owner does not have to improve his electric facilities, since he can use gas equipment or do without the improvement.

Consequently, Georgia Power looks upon its purchase of service entrance facilities as, in reality, purchase of additional service entrance capacity to provide for immediate and future use of major electric appliances.

(*Continued on page* 52)

Procurement & Products

OUTLOOK ▶ **Manufacturers look for good year ahead.** National Electrical Manufacturers Association forecasts a 7% increase in overall business by all segments of the electrical manufacturing industry. Wire and cable manufacturers anticipate a 10% gain. Makers of generation, transmission, and distribution equipment foresee a 8% gain over 1959 totals.

Equipment deliveries will also rise says the Commerce Dept's Business and Defenses Services Administration. According to BDSA, deliveries of transmission and distribution equipment in 1960 will be 3% above 1959, after racking up an 11% gain over 1958.

PRICES ▶ **Line Material Industries has announced 4½ to 9% reductions** in published prices of distribution lightning arresters, 15-kv and below. LM says the move stems from a desire to establish a firm market level and will result in price levels that were in effect prior to the Feb. 1959 increase. The company also announces that production economies have made possible reductions of 9 to 10% on 27 and 30-kv type SS arresters.

COAL ▶ **Electric utilities will consume nearly 12% more coal in 1960** than in 1959, predicts the National Coal Association. That would bring consumption to 190 million tons during this year. This increase is predicted on a rise in kwhr production from 700 billion kwhr in 1959 to 760 billion kwhr this year.

Settlement of strike was believed near at Pennsylvania Transformer Div as EW went to press. The strike, involving all of the 950 production workers, started Dec. 7 with expiration of a three-year contract with United Steelworkers of America. The company said the size of the proposed package increase was generally not an issue. Rather the issue was over apportionment of the increase as between wages and fringe benefits.

SUPPLIERS ▶ **Baldwin-Lima-Hamilton has formed a new industrial equipment division** to consolidate heavy equipment manufacturing lines at Eddystone, Pa. Certain products made at Hamilton and Middletown, Ohio, will be transferred to Eddystone. Frederick A. Fielder is named general manager of the new division.

CABLE ▶ **Russia is now fabricating a 500-kv ac oil-paper cable,** according to touring British cable engineers who recently made on-the-spot observations.

News of Manufacturers . . . . . page 56
New Equipment . . . . . page 59
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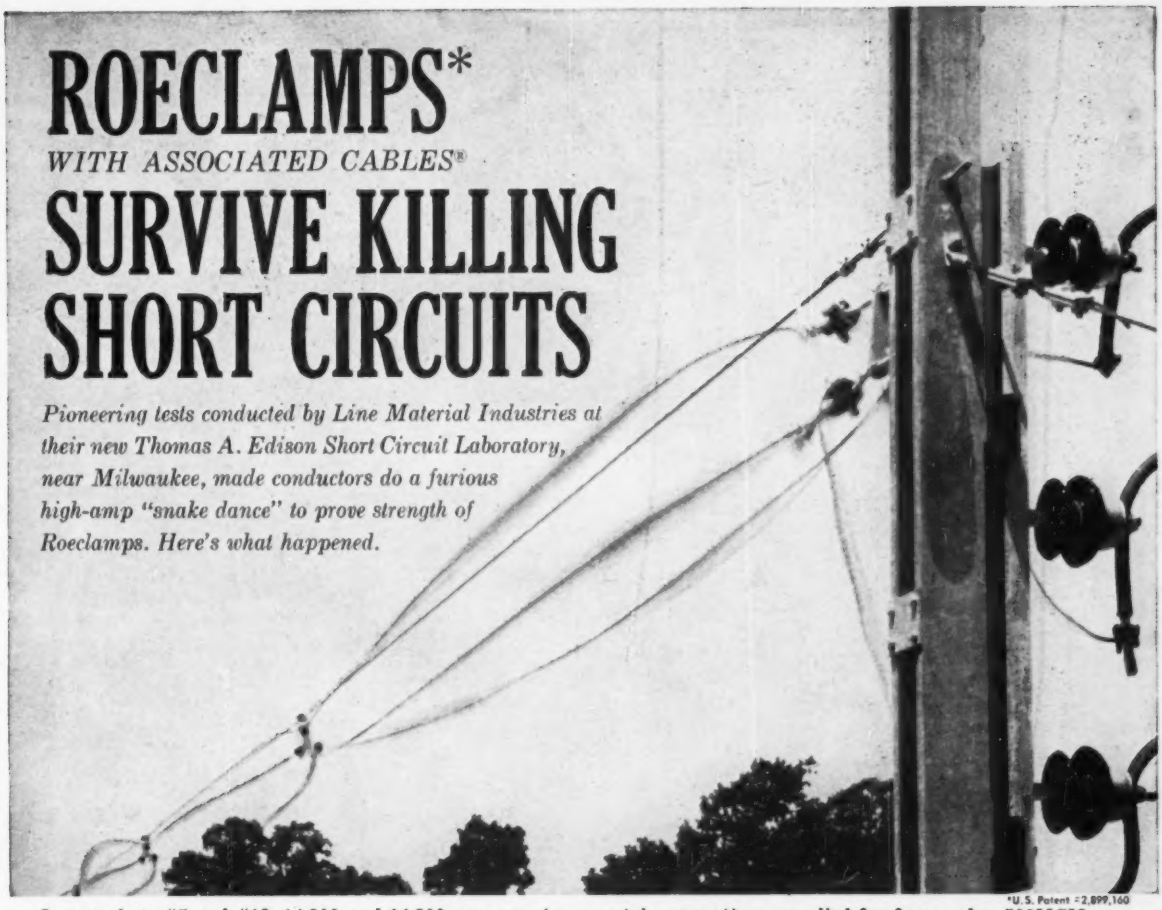
ROECLAMPS*

WITH ASSOCIATED CABLES®

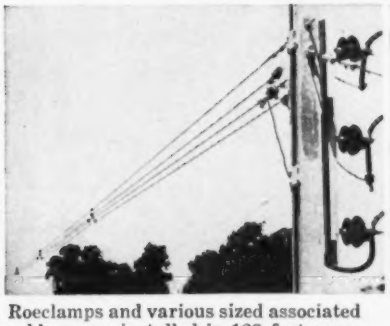
SURVIVE KILLING SHORT CIRCUITS

Pioneering tests conducted by Line Material Industries at their new Thomas A. Edison Short Circuit Laboratory, near Milwaukee, made conductors do a furious high-amp "snake dance" to prove strength of Roeclamps. Here's what happened.



*U. S. Patent #2,899,160

In test shots #7 and #12, 14,300 and 14,200 amperes (asymmetric current) are applied for four cycles. 500MCM conductors are whipped around with incredible force. Strong 5KV and 15KV Roeclamps contain the cables, and withstand this fantastic overload. These were two of over a dozen test shots conducted in the impartial Line Material laboratory.



Roeclamps and various sized associated cables were installed in 128 feet span, shorted at far end and linked with power source and controls inside Line Material Industries' new laboratory. Every 30 feet a Roeclamp holds cables and messenger firmly in place. Roeclamps require no installation tools, can be mounted in less than a minute, even with "boxing gloves" on.

In test shot #2, 3950 amperes (asymmetric current) was applied for 30 cycles to a #6 AWG conductor. This was approximately 100% beyond the rated thermal capacity of the insulation. Note that the 5KV Roeclamps are undamaged. In this test the intense heat (conductor temperature 395°C) elongated the cables but they soon resumed their former profile.

Line Material Industries' short circuit Lab features a closed circuit TV Monitor panel to observe testing. It has the most modern metering equipment, and the world's highest speed, 60-cycle generator for short circuit testing. This can deliver over 500,000 KVA of electrical energy momentarily. A 1,500,000 KVA air blast breaker can interrupt 80,000 amperes after any pre-set current flow.

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SEE THESE STARTLING TESTS OF ROECLAMPS WITH ASSOCIATED CABLES FOR YOURSELF

A 16mm color movie, showing the complete series of tests is now ready for showing to technical groups. For details write to Line Material Industries, McGraw-Edison Company, 700 W. Michigan Street, Milwaukee 3, Wis., or to Roebling's Electrical Division, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

Manufacturers View '60

(*Continued from page 57*)

General Electric Co

"1960 has all the indicators of a growth year—for the economy as whole and for the electrical industry. General Electric is looking forward to an exceptional year in materials, components and systems for industry, as its industrial customers modernize and expand for the 1960's. The company is in a strong position to benefit from the stepped-up business investment in capital goods.

. . . "There will be an upsurge in electric utility orders, although deliveries on some of the equipment with long manufacturing cycles, such as turbine-generators, will be down somewhat as a result of the low level of orders received in 1958. Business for electrical equipment related to community services such as street lighting and water and sewage treatment systems should be strong in 1960. . . ."

Ralph J. Cordiner
Chairman of the Board

Kaiser Aluminum & Chemical Corp

"We expect the early 1960's to bring fundamental changes in the design of transmission systems which will have a direct influence on the manufacture and sale of aluminum conductors. Important trends already in evidence include the transition to higher voltage primary and secondary systems, and the increased use of self-supporting aerial power cables, underground conductors and spacer cable systems.

"During the next 12 months we look forward to a substantial sales increase over 1959 of distribution-size aluminum conductors, while the sale of transmission cable should remain steady. Insulated product sales should continue to improve, as during the last half of the previous year. Conversions to aluminum are occurring with greater frequency, particularly in applications involving high voltage insulated cable, interlocked armor cable, power cable and building wire."

J. T. Dugall, Gen Mgr,
Electrical Conductor Div

Line Material Industries

"Since we enjoyed a good level of business in 1959, we look confidently to a greater volume in 1960.

"Our expectations for 1960 are not predicated solely upon industry growth. We expect to earn our progress through additional customer service, and through new and improved products."

R. G. Wheaton
President

Ohio Brass Co

"We face 1960 with considerable enthusiasm. Our plant expansion plans, which have been quite ambitious over the past three years, are complete and we anticipate much lower capital expenditures in 1960.

"We are very much encouraged by evidence of renewed interest in extra-high voltage construction. In addition, the outlook for distribution materials is definitely better. The expansion of our product lines and the strong growth pattern of the industry certainly support this optimism—"

Louis J. Ott, Vice President &
General Sales Manager

H. K. Porter Co, Inc

"During 1959, our business serving the generating phase of the utilities was slow compared with 1958. This did give H. K. Porter's Delta-Star Division opportunity to design new products and improve existing ones, which will be ready for the coming upsurge of business. Distribution equipment such as transformers and lightning arrestors showed increased volume in 1959.

"We are looking ahead to 1960 for the beginning of increasing sales of products for power generation and continued improvement in products for distribution.

"Expansion of H. K. Porter's position as a supplier of equipment to utilities will undoubtedly be improved by the acquisition of one or more companies during 1960."

J. A. Drain
Vice President

Preformed Line Products Co

"In the year 1959 (we) effected an increase of 22% in net sales over the company's 1958 figure. This is 5% better than the 17% increase that was forecast for 1959.

"For 1960, PLP contemplates additional growth and expansion with a forecast of 15% increase in sales volume. The company has already completed arrangements for extension of the Palo Alto, Calif., plant, and further expansion of the Research & Engineering Center, and production facilities in Cleveland."

Edmund H. Brown
Vice President—Sales

Square D Co

"We are presently enjoying one of the best years in our history. Incoming orders for the first ten months were up more than 25% over last year's and 7% over 1957's. Total 1959 sales volume should exceed $108 million, and the net will be better than $1.75 to $1.80 per share. The net per share in 1958 was $1.11. The highest previous sales volume was $104 million in 1957."

Gordon Patterson
President

Westinghouse Electric Corp

"Electrical manufacturers, in 1960, expect to obtain 13% more new orders than in 1959—and 1959 has been a peak year. This new business will come from many directions.

"Consumers will spend more than ever before for electrical products, bringing an increase of some 5% or more in the sale of appliances and other electrical products for the home.

"New orders for all types of capital goods will be about 20% higher than in 1959. The electric utility industry already is thoughtfully looking ahead to the power demands looming for the mid 1960's. The commercial and industrial markets will produce an increase of 14% in new orders as 1960 launches the massive surge of new construction and modernization which will be a trade mark of the next decade —a decade that will see $600 billion worth of construction of all types.

"In 1960, Westinghouse sales are expected to exceed all previous records, . . . to produce billings at least 10% over 1959. Incoming orders should increase about 15% over '59 total."

Mark W. Cresap, Jr.
President and Chief Exec. Officer

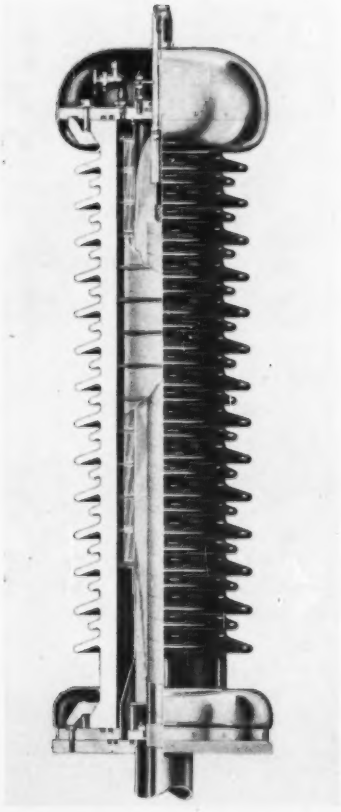
(For further information refer to Readers Service on page 61)

High-Pressure Contacts . . .

. . . do not gall, permit heavy wiping action and eliminate corrosion under adverse atmospheric conditions. The solid silver to solid silver contacts are available in the company's line of TG and YVH air disconnect switches. The new process employs a special rolling procedure that hardens coin silver harder than hard drawn copper.
Federal Pacific Electric Co, 50 Paris St, Newark 1, N. J.

Silicon Rectifier . . .

. . . conversion units are available for use with rectifier transformers rated up to 75 kv rms, and up to 45 kva in full-wave bridge rectifier circuits. Used in dc power supplies on electrostatic flyash precipitators, they replace vacuum tubes or mechanical rectifiers. They consist of rectifier diodes immersed in oil.
General Electric Co, Schenectady 5, N. Y.



Capacitor-Graded Pothead . . .

. . . is suitable for use on low-pressure oil-filled cables or high-pressure (oil or gas) pipe type cables. Four BIL ratings—550, 650, 750 and 1,050—cover the range of voltages from 115 to 230 kv. A continuous, narrow aluminum foil has been attached to the paper buildup roll in such a manner as to generate the stress cone when the buildup is wrapped over the cable.
Ohio Brass Co, Mansfield, Ohio.

(*More New Equipment on page* 60)

Mansfield, Dissmeyer Named Ohio Ed VPs

D. Bruce Mansfield, general counsel, and Ed F. Dissmeyer, in charge of production and transmission, have been elected executive vice president and vice president, respectively, of Ohio Edison Co. John R. White was appointed senior attorney and will be in charge of the utility's legal department.

MANSFIELD

Mansfield joined Ohio Ed in 1948 as general counsel. From 1938 to 1940 he was an attorney with the Securities and Exchange Commission in Washington. In 1941 he became a member of the law firm of Amerman, Mills, Mills, Jones & Mansfield, Canton, Ohio, where he remained for seven years.

Dissmeyer has been associated with the power company and predecessor affiliated companies for more than 30 years. He was named chief engineer in 1952. In March, 1958, he was delegated to handle special engineering and operating assignments; in January of this year he was placed in charge of production and transmission.

DISSMEYER

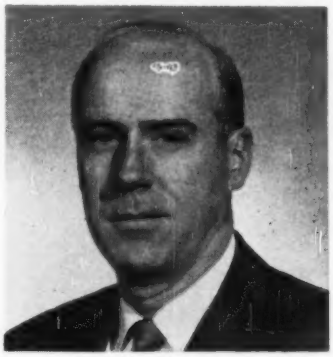
Superior Cable Elects Robb President

Superior Cable Corp has elected James L. Robb president. He succeeds R. Walker Geitner who becomes chairman of the board.

Robb has been with Superior Cable since its inception. He has served successively as assistant to the president, chief engineer, vice president, and executive vice president.

He also worked with the Rural Electrification Administration for five years, and as outside plant engineer with the New York Telephone Co.

Robb is a graduate of George Washington University.



Continental-Diamond Names Briggs Vice President

Arthur J. Briggs has been made vice president in charge of marketing at Continental-Diamond Fibre Corp. He will be in charge of all of CDF's sales and marketing functions.

Briggs, who had been vice president in charge of sales, has been with the company for 34 years. He began his sales career as a customer service representative in the company's Toronto and Bridgeport plants. He later served as a salesman in the Cincinnati sales territory.

In 1935 he was promoted to resident manager of CDF's Detroit sales office, and, in 1947, manager of the Cleveland district sales offices. In 1952 he was transferred to Chicago as district manager.

After CDF was acquired by The Budd Co, Briggs went to the Newark, Del., headquarters as general sales manager.

(*More News About People on page* 64)

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The Meetings Calendar

JANUARY—1960

Electric Companies Public Information Program—Power Progress Dinner, Le Chateau, Savoy Hilton, New York City, Jan. 11; PIP Workshop Conference Committee, Sheraton-Park Hotel, New Orleans, La., Jan. 20.

Edison Electric Institute—Electric Space Heating & Air Conditioning Committee, Washington, D. C., Jan. 11-12; Industrial Relations Committee Jointly Sponsored with the Southwestern Personnel Group, Dallas Sheraton Hotel, Dallas, Tex., Jan. 21-22; Transmission & Distribution Committee, Hotel Soreno, St. Petersburg, Fla., Jan. 21-22; EEI-AGA Taxation Accounting Committees, Sheraton-Jefferson Hotel, St. Louis, Mo., Jan. 25-27.

• **Sixth National Symposium on Reliability & Quality Control**—Statler-Hilton Hotel, Washington, D. C., Jan. 11-13.

• **Pennsylvania Electric Association**—Advertising Committee, Harrisburg, Pa., Jan. 11-12; Industrial Committee, Pittsburgh Airport, Pittsburgh, Pa., Jan. 15; Customer Contact Committee, York, Pa., Jan. 20; Street & Highway Lighting Committee, Harrisburg, Pa., Jan. 21; Systems Operation Committee, Benjamin Franklin Hotel, Philadelphia, Pa., Jan. 21-22; Land & Land Rights Committee, Philadelphia, Pa., Jan. 28-29; Personnel Practices Committee, Reading, Pa., Jan. 28; Accident Prevention Committee, Pittsburgh, Pa., Jan. 28-29; Transmission & Distribution Committee, Pittsburgh-Hilton Hotel, Pittsburgh, Pa., Jan. 28-29.

Society of Plastics Engineers—16th Annual Technical Conference, The Conrad Hilton Hotel, Chicago, Ill., Jan. 12-15.

Industrial Heating Equipment Association—The Warwick Hotel, Philadelphia, Pa., Jan. 18-19.

Electric Council of New England—Transmission & Distribution Committee, Engineering & Operations Division, Armand's Beacon Terrace, Framingham, Mass., Jan. 20.

Oklahoma Utilities Association—Accounting Section, Tulsa, Okla, Jan. 22.

National Association of Corrosion Engineers—Fifth Annual Corrosion Control Short Course, University of Houston, Houston, Texas, Jan. 22-23.

Hydraulic Institute—Homestead, Hot Springs, Jan. 25-27.

Canadian Electrical Association—Eastern Zone, Chateau Frontenac, Quebec, Canada, Jan. 25-28.

National Association of Purchasing Agents—Public Utility Buyers Group, Mid-Winter Meeting, Atlanta Biltmore Hotel, Atlanta, Ga., Jan. 31-Feb. 1-2.

American Institute of Electrical Engineers—Winter Meeting, New York City, Jan. 31-Feb. 5.

FEBRUARY

Edison Electric Institute—Prime Movers Committee, Sheraton-Cleveland Hotel, Cleveland, Ohio, Feb. 1-3; Industrial Power & Heating Group, Netherland Hilton Hotel, Cincinnati, Ohio, Feb. 4-5; Electrical System & Equipment Committee, Bellevue-Stratford Hotel, Philadelphia, Pa., Feb. 15-16; EEI-AGA Accounting Conference Final Working Meeting, Sheraton-Cadillac Hotel, Detroit, Mich., Feb. 15-16; Commercial Cooking & Water Heating Committee, Atlanta, Ga., Feb. 18-19.

Instrument Society of America—Instrument-Automation Conference and Exhibit, Sam Houston Coliseum, Houston, Tex., Feb. 1-4.

American Society of Heating, Refrigerating and Air-Conditioning Engineers—Semi-Annual Meeting and Second Southwest Heating and Air-Conditioning Exposition, Baker Hotel, Dallas, Texas, February 1-4.

Fourth National Industrial Electric Heating Conference—Sponsored by The Industrial Electrification Council, Netherland-Hilton Hotel, Cincinnati, Ohio, Feb. 1-4.

American Society for Testing Materials — Committee Week, Hotel Sherman, Chicago, Ill., Feb. 1-5.

Pennsylvania Electric Association—Electrical Equipment Committee, Harrisburg, Pa., Feb. 4-5; Joint Meeting of Relay and Communications Committee, Hotel Bellevue-Stratford, Philadelphia, Pa., Feb. 11-12; System Planning Committee, Hotel Pittsburgh-Hilton, Pittsburgh, Pa., Feb. 15-16; Prime Movers Committee, Hotel Bellevue-Stratford, Philadelphia, Pa., Feb. 18-19.

National Electrical Week—Feb. 7-13.

Missouri Valley Electric Association—Industrial & Commercial Sales Conference, President Hotel, Kansas City, Feb. 8-9.

American Institute of Mining, Metallurgical and Petroleum Engineers—Annual Meeting, Hotel Statler, N. Y., Feb. 14-18.

• **Agricultural Cooperative Conference**—University of Kentucky, Feb. 16-17.

• Additions this week.

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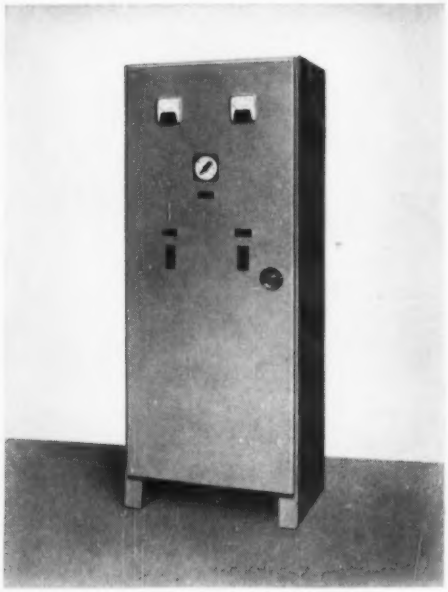

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